UNIVERSIDAD DE ALMERÍA

ANÁLISIS EXPERIMENTAL DE LAS CONDICIONES QUE INFLUYEN EN LA APARICIÓN DEL COMPORTAMIENTO HUMORÍSTICO

EXPERIMENTAL ANALYSIS OF CONDITIONS IMPACTING THE EMERGENCE OF HUMOR BEHAVIOR

TESIS DOCTORAL

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ABSTRACT

Humor behavior is shown in many different ways although typically it can be observed commonly through someone's laughter at something, typically to so-called jokes. Humor is an important social factor, in which people smile or laugh more with members of the in-group (Platow, 2005), it builds a group identity (Robinson & Smith-Lovin, 2001), and can create feelings of closeness in meetings with strangers who laugh and share their sense of humor (Fraley & Aron, 2004). It has been found that laughter occurs on average eighteen times per day in many different circumstances (Martin & Kuiper, 1999) as, for instance, on social media, TV, books, newspapers, listening in joke-programs, as well as daily social interactions. That is, it is an important part of our social daily activities with importance implications in many domains. One area in which humor behavior has shown to be beneficial is in promoting psychological health. In this respect, studies have linked humor to benefits in, among others, promoting a better recovery after physical illness (Peterson, Park, & Seligman, 2006); enhancing happiness in positive psychology interventions (Wellenzohn, Proyer, & Ruch, 2016); in improving emotional regulation (Samsom & Gross, 2012); and enhancing friendly and collegial relationships in the workplace (Holmes & Marra, 2002).

The relevance of the literature pointing to the benefits provided by humor behavior, across several domains, mainly, psychological health, is an important step although it does not permit to understand the conditions given rise to this complex behavior. Several problems emerge when approaching the analysis of such behavior. On the one hand, there is a lack of consensus in conceptualizing as well as in defining and measuring its particulars. On the other hand, the research conducted towards the analysis of the conditions for human response to occur is absent. In other words, the experimental analysis of humor response is still a horizon to be explored. Our interest in this thesis is connected to the latter point.

Chapter 1 will present an overview of humor behavior and the existing empirical research that supports it. The core experience of a humor behavior is the ability to respond to something as funny (Ruch, 2008). Inevitably, like any other human experience, there is variability in the way that people respond to a joke. This is so because of the different aspects of humor behavior. On the one hand, there is a person who generates the joke (i.e., a relation of at least two different ideas, resulting in a funny response at the end), comprehends it as such and then delivers it; on the other hand, there are those who understand the joke, and may or may not laugh at it, according to this understanding (Ritchie, 2018).

Humor has been considered a language-based skill that is experienced across cultures, and it is an important attribution of human behavior (Apte, 1985; Lefcourt, 2001). However, the commonality of humor mostly stops there. The cognitive account of humor is the most frequent conceptualization on humor and has given an extensive number of studies and theories that falls into three broad categories (Weinberg & Gulas, 2019; Martin & Ford, 2018). One is that focused on Cognitive-Perceptual as the perception of two typically disparate ideas that cause humor responses (Suls, 1972). The second one is that focused on Superiority as a form of aggression that one feels over other people (Gruner, 1978). And, the third theory is the Relief as a buildup of tension that is suddenly relieved, resulting in humor response (Spencer, 1911). These theories are often combined to produce numerous sub-types of ideas that, as clearly stated in the review done by Weinberg & Gulas (2019), at the very end, the situation is somehow chaotic and impact in the difficulty to understand these theories as well as in the difficulty for doing research.

The studies conducted are mostly correlations between showing human behavior and others behaviors and show a very diverse panorama in many respects as the different ways of measuring humor behavior and a diverse account of the results. This might be a result of the lack of consensus about the characteristics of humor. In addition, and perhaps more

importantly, it is the absence of studies that are focused on the conditions under which humor behavior emerges.

In the middle of the heterogeneity of accounts of humor behavior, it seems that there is some light. It is the incongruity characteristic that seems to be pointed as a necessary condition to generate humor behavior (Martin & Ford, 2018; McGhee, 1979; Morreall, 1983; Raskin, 1985; Ritchie, 2018). Incongruity is defined as the perception of conflicting expectations arising when hearing or reading the contents of a joke (Ritchie, 2004).

Though infrequently discussed in behavior analysis, efforts to understand humor from this view have also been made. Skinner (1957) did mention humor behavior several times in his book *Verbal Behavior*. He described many situations that can lead people to laugh, such as awkwardness, clumsiness, surprisingness, distortions, far-fetched rhymes, metaphors, amusement in character, exaggeration, weakness, and unexpected intraverbal responses. In addition, Skinner pointed out in the context of generalized reinforcement that a "joke which has been particularly successful is likely to be told again" (Skinner, 1957, p. 148). Michael, Palmer, and Sundberg (2011) further extend Skinner's theory of multiple control in the context of using puns. They suggest several thematics that might be related to critical responses, including a primary thematic source and one or more secondary sources. The critical response should be the element (e.g., word or phrase) within the joke that has multiple sources of control. This will be related to practical effects on the listener's response. Humor response is typically determined by competing response tendencies. Let us imagine Alfonso, Maria, and Pedro still in the car when the broadcaster tells another joke, "'I love the feeling when I can make people open up to me', that's what the surgeon Mike said, *Hahaha*" (short-funny.com). In this joke, the phrase "the surgeon Mike" is the critical response once this is related to the practical effect of moving past the fear (i.e., thematic variable) but also related to the fact that one has to jump over hurdles (i.e., a secondary source of stimulation).

The functional account of language and cognition proposed by Relational Frame Theory (RFT) mentions humorous stories as a kind of specific relation between networks and the conditions under which the networks will be completed. Some contextual cues lead the listener to respond to storytelling with beginning, middle, and end, but then the listener realizes that there is no end to the story, it is a joke, and it is not truly about anything. The basic humor process is defined as "most jokes create relational networks that are complete, meaningful, and coherent but incongruous" (Stewart, Barnes-Holmes, Hayes, & Lipkens, 2001, p. 83, 2001, p. 83). The related network seems congruous and complete to the listener until the punch line. Suddenly and unexpectedly (thus the metaphor of a "punch"), the network collapses incongruously and then reforms a moment later, unusually and ridiculously (Stewart et al., 2001).

To exemplify, Stewart et al. (2001) given the example of the movie Marry Poppins, "One guy says to another, 'I met a man today with a wooden leg, named Smith.' So, his friend replies, 'What was the name of his other leg?'" It is suggested that the first sentence, "I met a man named…," is reinforced via a verbal community complete with a name. The last name "Smith" is a well-known surname, and its presence makes the conventional relation cohere— it seems to be the man's name. From the lens of RFT, "man" and "Smith" are framed in coordination, and the naming context and last name itself are both contextual cues for that relation. According to this assumption, "with a wooden leg" is in hierarchical relation with "man." When the other man responds, it surprises the listener and initially appears to be almost a nonsense sentence. As if it is one in a class of names, asking for the other name serves as a contextual relation for a different and dominant relation between man, leg, and Smith. The name "Smith" is in a hierarchical relation with the wooden leg (i.e., it is part of the man). This resolution is technically possible but also incongruous. The relational network collapses from

a story that appears to be conventional, complete, and coherent, but it is also unexpected and incongruous (Stewart et al., 2001).

The mainstream humor research devoted considerable attention to testing the conditions of humor theories, with most of researchers and theorists making refinements in the level of cognitive-perceptual (Martin & Ford, 2018). For example, in a classical study that tasted incongruity-resolution hypothesis, Schultz (1974) analyzed whether the information in jokes tends to be processed in sequential order, with incongruity being detected first and then the information will serve to resolve the incongruity. Participants were exposed to a series of verbal jokes or visual cartoons, and then they reported identifying the order in which they noticed the elements. The findings showed that participants detected implicit resolutions after incongruity in the cartoons and jokes, supporting the previous hypothesis. More recently, Juckel et al. (2011) directly examined the temporal dynamics of humor appreciation (i.e., incongruity detection). Participants watched a humorous movie ("Mr. Bean") while they were wearing a digital reference on their face to measure the movements of the forehead and mouth. Kinematical parameters allowed direct measurement of laughter, and the findings showed that participants laughed after the stimulus onset between approximately 500 and 3,000 ms. Despite the vast individual differences in facial expression, the authors suggest that incongruity can be resolved as quickly as 500 ms.

However, those studies do not provide the conditions in which humor behavior occurs on a personal history level. Thus, why one person laughs at a joke remains unanswered. There would be no humor if the features of relational framing did not lead to a specific derived relation (Hayes & Hayes, 1989). The derived relation responses are the core for the new relations that emerge to oneself and how one interacts with one's own thoughts, emotions, and memories that get updated depending on the context. However, what happen when the derived relation is related to other relations?

According to RFT, the individuals' thoughts and emotions are self-contents or self-rules. Throughout the development of the verbal community, they have learned to understand, create, and follow the rules when they become fluent in framing. Self-rules will vary across cultural contingencies, depending on the context of each individual, the way their behavior has been treated, and how they have learned to derive (Luciano, 2017). Reaction to one's own behavior (the function acquired by the rules derived or provided by others) has been called rule-governed behavior, or verbal regulation. A rule-governed behavior, or verbal regulation, is the reaction to one's own behavior (i.e., the rules derived or provided by others acquire a function), which works as a functional stimulus that specifies antecedents, actions, and consequences (i.e., Skinner, 1969; Zettle & Hayes, 1982). Thus, the rule is an individual product that responds both to multiple interactions with the verbal community and to the natural contingencies that an individual encounters during their development.

To sum up, we have seen the development of relational behavior, and how the derived relational behavior influences the emergence of humor. Humor is a complex behavior that seems to involve complete, meaningful, and coherent relational networks, but which are nevertheless incongruous (Stewart, Barnes-Holmes, Hayes, & Lipkens, 2001). Depending on the personal history of relating the different aspects that might be involved in the content of the joke, one can derive thoughts and feelings that are, or are not, in conflict and, consequently, might derive in humor behavior.

Chapter 2 will present the empirical study 1. In this chapter, the impact of three different elements that might prevent the humor function of the joke. To this end, we distributed those elements in three experimental protocols to explore the conditions that might alter humor emergence: Reality (by inviting the participant as if being in the situation described in the joke), Identification (by inviting the participant to take the perspective of the characters in the joke), and Discomfort (describing the discomfort of the characters in the joke). Their effects on humor

were measured using facial responses as the primary indicator and self-reports as a secondary measure.

Twenty-three Spanish-speaking undergraduate students participated (14 female; age range 21-33) in exchange for course credits. Participants were randomly assigned to one of two conditions. The experimental sequence began with an initial assessment, where participants pre-experimental measures (e.g., the AAQ-II, IRI-PT, and STCI-S questionnaires). The Acceptance and Action Questionnaire-II (AAQ-II Bond et al., 2011) measure the reported psychological (in)flexibility. Then, Perspective Taking, a scale of the Interpersonal Reactivity Index (IRI, Davis, 1983; Spanish version by Escrivá, Frías, & Samper 2004) measures the subject's attempts to adopt another's perspective in real situations. Finally, Cheerfulness and Seriousness scales of the State Trail Cheerfulness Invesntory (STCI-S; Ruch, Kohler & van Thriel, 1997; Spanish version by López Benítez, Acosta, Lupiáñez, & Carretero-Dios, 2017) measure whether a person is prompt to take the situation in cheerfulness or seriousness way. This assessment was used to explore if there was any difference between conditions and to analyze if any, those correlations. Then, the experimenter (who was the same for all participants) briefly explained that the purpose of the study was to determine how people responded to different contexts and tasks. He also indicated that all instructions would appear on the computer screen: "*Our responses change depending on the circumstances. Sometimes we watch a movie and get excited, while sometimes, we do not. Sometimes we see something and have feelings of pleasing or fun, while other times, we feel boredom, annoyance, pain, or discomfort. In this study, we try to investigate how we respond to different situations. There are no right or wrong answers. Whatever you might respond to will be fine. We kindly request you to pay attention and answer honestly.*"

In Phase 1, for participants in the Control condition, four jokes were presented, starting with the Doctor joke, followed by the Beer joke, the Job joke, and ending with the Soccer joke. In the Experimental condition, the same four jokes were also presented, but the first three were preceded by the respective experimental protocol (that is, the reality, Identification, and Discomfort protocols). The Reality protocols added contextual cues to situate the participant in the joke situation (e.g., "*Please imagine that you are in a hospital... that what you are listening to is real as if it were happening at this moment*"). Then, the Identification protocol aimed to invite the participant to take the perspective of the joke character (e.g., "*You are going to read something about someone named Juan. We ask you to try to imagine that you are him*"). Finally, the Discomfort protocol was applied, indicating a situation in which the joke character was in a bad moment (e.g., "*Now you are going to watch a job interview. These are interviewers who laugh at people and set up false interviews to laugh at candidates.*"). After the three manipulated jokes were presented, the fourth joke (the Soccer joke) was presented without manipulation. Then, all participants were invited to a 10-minute break, after which they went through the second phase of the experiment. In both conditions, this phase presented the four jokes without manipulation in the same order as in the first part (i.e., Doctor, Beer, Job, and Soccer).

The results obtained might be summarized as follows. Firstly, when participants were presented with the jokes for the very first time, those in the Control condition smiled and reported the joke as funny. This result occurs in all the jokes, which replicates previous studies where these jokes were evaluated as funny jokes in this type of university population. In contrast, the findings from the Experimental condition showed that the experimental protocols effectively produced consistent, replicable changes in how participants responded to the jokes. Specifically, participants did not smile and did not report the joke as funny when the Reality and Discomfort protocols were implemented, while a variable effect was obtained when the

Identification protocol was in place. When the jokes were presented for the second time in the Phase 2, participants in both conditions reduced smiling responses, with no significant differences between the conditions (except for the Soccer joke). These findings might indicate that being re-exposed to the jokes (even being the first time without any manipulation, as in the experimental condition) impacted laughing. These results might be analyzed considering the relatively short interval between the two exposures to the joke. Longer intervals might result in no reduction of the humor responses.

To conclude, this paper constitutes a first exploratory study showing the disruption of humor responses when the Reality and the Discomfort protocols were implemented, and to a lesser degree with the Identification protocol, which in turn might be useful to answer our original question of why a joke produces humor for a person. The study was not designed to compare these three protocols among them but to analyze each of them in the context of a joke with no protocols. Also, the study was not designed to isolate the processes involved in each of these protocols when they alter the functions that typically generate the joke. All in all, conclusions should be considered cautiously, and replications are needed. Further research will focus on clarifying the functional roles of perspective framing as processes involved in changing the functions of the networks of the jokes, either for preventing or for promoting the emergence of humor behavior. That way, the incongruity that has been advocated in the humor literature, might be distilled in the relational processes involved in humor behavior.

Chapter 3 will present the empirical Study 2 and extend the findings of the previous study that remained unanswered. This study aimed include all the relational functions explicitly that might affect the emergence of humor behavior. It focused on the functional role of deictic framing with discomfort functions as psychological processes involved in changing the functions of relational networks involved in-jokes. RFT has accounted for perspective taking

(PT) as deictic relational frames - interpersonal (*I* versus *You*), spatial (*Here* versus *There*), and temporal (*Now* versus *Then*). Recent research on deictic framing showed that when introduced perspective of others impacts on own perspective (e.g., McHugh, Barnes-Holmes, & Barnes-Holmes, 2004; Villate et al., 2012; Barbero-Rubio, et al., 2016). In addition, the evidence has shown that once a stimulus acquires a function, the function of the stimuli related to it is transformed depending on the type of relation established with them (And & Roche, 2015; Dymond & Barnes, 1995, 1996; Dymond & Fergunson, 2007; Dymond, Roche, Forsyth, Whelan & Rhoden, 2007, 2008; Rodríguez-Valverde, Luciano, & Barnes-Holmes, 2009; Stewart, Hooper, Walsh, O'Keefe, Joyce, & McHugh, 2015; Whelan, Barnes-Holmes & Dymond, 2006).

To this end, both elements were mixed to alter humor responses; that is, framing all the jokes in one protocol that include perspective frames of I-Here-Now with functions of discomfort. Also, we will isolate the impact of either the perspective-taking or discomfort functions in the humor responses to the two jokes. Parallel to this, to avoid the carry-over effects of presenting all the jokes to the same participants, we will include another way to disrupt the relational network involved in the jokes by desliteralizing the functions of some words in the joke (Masuda et al., 2004; Valdivia et al., 2006; Masuda et al., 2008).

To achieve these goals, this study aimed to compare the effect of four protocols on humor responses using the same four jokes of the previous study (i.e., the Doctor, Beer, Job, and Soccer jokes). Two experiments with six conditions were conducted to alter the humor responses of the jokes. Experiment 1 included two protocols in one of the two conditions. Specifically, two jokes were preceded by (1) one protocol that invited the participant to take the perspective of the joke characters that feel discomfort in the situation of two jokes; and one joke (2) included adding words, letters, and colors, as well as altering the timing and order of

sentences. The second experiment stems from the first, including the same protocols for different jokes and adding two protocols that consisted of (3) inviting the participant to take the perspective of the characters in two jokes; (4) and describing a situation in two jokes that the joke characters feel discomfort. With that, in Experiment 2, two jokes received three different protocols. Their effects on humor were measured using facial responses as the primary indicator and self-reports as a secondary measure.

In Experiment 1, twenty undergraduates (13 females; age range = 18-40 years) attending different courses at the University of Almería participated in the experiment. The experimental sequence was identical to that previously described in the Chapter 2. First, participants responded to the questionnaires (i.e., AAQ-II, IRI, and STCI-S). Then, participants were randomized to one of the two conditions: *Control* and *Mix Control Desl* conditions.

The four jokes and the in-between activities were used in both *Control* and *Mix Control Desl* conditions, and they only differed in the presentation of the experimental protocols in the latter. In the *Control* condition, participants were presented firstly with the Soccer joke, followed by the Job joke, and then followed by the Beer and Doctor jokes. All jokes and activities were displayed in the computer screen, with a gray screen separating the presentation of each joke and the presentation of the in-between activities. In the *Mix Control Desl* condition, the Mix protocol was presented before the Soccer (e.g., *"Try to imagine for a few minutes that you are José... and that you are playing a soccer match against Marcos... You are rivals..."*) and Job jokes (e.g., *"Now you are going to watch a job interview. These are interviewers who laugh at people and set up false interviews to laugh at candidates (…) We ask you to try to put yourself in the shoes of the person you are about to interview..."*). The Beer joke was then presented without any manipulation, and the Desliteralization protocol was presented before the Doctor joke. As in the previous condition, activities were presented in-

between jokes. After the fourth joke was presented in each condition, the computer screen indicated that the experiment had concluded, and participants were debriefed.

The results indicated that the jokes produced a humor response for almost all the participants in the *Control* condition, but that when they were manipulated with the experimental protocols, they produced less smiling and were considered as less funny. This effect is more evident for the Soccer and Doctor jokes (Mix and Desliteralization protocols, respectively), and to a lesser degree for the Job joke (Mix protocol).

With the same goal of Experiment 1, in Experiment 2 we exposed the participants to two equivalent conditions of the first experiment, except that the jokes order was different. Also, we isolate the two elements of the Mix protocols and generate two different protocols: the Discomfort and Identification protocols. Thus, the Mix, Discomfort and Identification protocols were applied to the same two jokes, in order to compare the different effects in the humor responses. Lastly, the Desliteralization protocol was also replicated to different jokes.

Thirty-eight undergraduates (26 females; age range = 18 – 37) were recruited, compensated for the participation, and debriefed as in Experiment 1. The experiment was conducted identical to Experiment 1.

The conditions in Experiment 2 also received four jokes with in between activities but differ of the Experiment 1 in the jokes order. *Control* and *Mix Control Desl* conditions presented firstly Doctor and Beer jokes, followed by Job, and Soccer jokes, and *Disc Control Desl* and *Id Control Desl* conditions only changed the last two jokes order (i.e., ending with Soccer and Job jokes). The Mix, Discomfort, and Identification protocols were exposed separately in three different conditions, preceding the same Doctor and Beer jokes. Then, a third joke was exposed without any protocol, followed by the last joke with Desliteralization protocol.

The results indicated a similar pattern of Experiment 1, in which participants in the *Control* condition showed a higher percentage of smiling and reporting the jokes as funny than participants exposed to the condition with experimental protocols (i.e., Mix and Desliteralization protocols). These protocols reduced the smiling and reporting funny in almost all the participants exposed to them.

Data from Discomfort and Identification protocols revealed that the smiling and reporting of the jokes as funny of the participants was lesser to the same jokes in the *Control* condition. Looking at facial responses and self-reports in these protocols, they pointed to different directions in the participants, resulting in a higher non-correspondence of measures. When in the last two jokes, data show a similar pattern in the smile and funny report presence when the joke has no protocols and for the manipulated joke with the Desliteralization protocol.

In conclusion, this study adds empirical evidence of the impact of deictics I-Here-Now with discomfort functions in altering the humor derivation. The results showed that mainly two protocols were effective: (1) the so-called Mix protocol established a context to the four jokes by framing the deictic of I-Here-Now with discomfort functions; and (2) the Desliteralization protocol added new functions in the joke network. Further studies on humor are encouraged to replicate those elements and modify them to explore the potential of different elements, either for preventing or promoting the emergence of humor (e.g., what might be the case by changing the deictic framing to Other-There-Then with appetitive functions?). The present study contributes to comprehending the elements that might be present when someone does not smile at a joke.

Finally, the *Chapter 4* will describe the contributions of the current dissertation and discuss implication about the results obtained, which emphasizes to understand the role of deictics I-Here-Now with discomfort functions in altering the humor derivation. The limitations and proposal for future studies are discussed.

RESUMEN

El comportamiento humorístico se muestra de muchas maneras diferentes, aunque normalmente se puede observar a través de la risa de alguien ante algo, normalmente ante los llamados chistes. El humor es un factor social importante, en el que las personas sonríen o se ríen más con los miembros del grupo interno (Platow, 2005), construye una identidad de grupo (Robinson y Smith-Lovin, 2001) y puede crear sentimientos de cercanía en los encuentros con extraños que ríen y comparten su sentido del humor (Fraley y Aron, 2004). Se ha comprobado que la risa se produce una media de dieciocho veces al día en muchas circunstancias diferentes (Martin & Kuiper, 1999) como, por ejemplo, en las redes sociales, la televisión, los libros, los periódicos, la escucha de programas de chistes, así como en las interacciones sociales diarias. Es decir, es una parte importante de nuestras actividades sociales diarias con implicaciones importantes en muchos ámbitos. Un área en la que el comportamiento humorístico ha demostrado ser beneficioso es en la promoción de la salud psicológica. En este sentido, los estudios han relacionado el humor con beneficios, entre otros, en la promoción de una mejor recuperación después de una enfermedad física (Peterson, Park, & Seligman, 2006); en la mejora de la felicidad en las intervenciones de psicología positiva (Wellenzohn, Proyer, & Ruch, 2016); en la mejora de la regulación emocional (Samsom & Gross, 2012); y en la mejora de las relaciones amistosas y colegiales en el lugar de trabajo (Holmes & Marra, 2002).

La relevancia de la literatura que señala los beneficios proporcionados por el comportamiento del humor, a través de varios dominios, principalmente, la salud psicológica, es un paso importante, aunque no permite comprender las condiciones que dan lugar a este complejo comportamiento. Varios problemas surgen al abordar el análisis de dicho comportamiento. Por un lado, existe una falta de consenso tanto en la conceptualización como en la definición y medición de sus particularidades. Por otro lado, la investigación dirigida al

análisis de las condiciones para que se produzca la respuesta humana está ausente. En otras palabras, el análisis experimental de la respuesta del humor es todavía un horizonte por explorar. Nuestro interés en esta tesis está relacionado con este último punto.

El *Capítulo 1* presentará una visión general del comportamiento del humor y de la investigación empírica existente que lo respalda. La experiencia central de una conducta de humor es la capacidad de responder a algo como gracioso (Ruch, 2008). Inevitablemente, como cualquier otra experiencia humana, existe una variabilidad en la forma en que las personas responden a un chiste. Esto es así debido a los diferentes aspectos del comportamiento humorístico. Por un lado, hay una persona que genera el chiste (es decir, una relación de al menos dos ideas diferentes, que da lugar a una respuesta graciosa al final), lo comprende como tal y luego lo emite; por otro lado, hay quienes entienden el chiste, y pueden o no reírse de él, según esta comprensión (Ritchie, 2018).

El humor se ha considerado una habilidad basada en el lenguaje que se experimenta en todas las culturas, y es una atribución importante del comportamiento humano (Apte, 1985; Lefcourt, 2001). Sin embargo, el carácter común del humor se detiene principalmente ahí. El relato cognitivo del humor es la conceptualización más frecuente sobre el humor y ha dado un extenso número de estudios y teorías que se engloban en tres grandes categorías (Weinberg y Gulas, 2019; Martin y Ford, 2018). Una es la centrada en lo Cognitivo-Perceptual como la percepción de dos ideas típicamente dispares que provocan respuestas de humor (Suls, 1972). La segunda es la centrada en la Superioridad como una forma de agresión que se siente sobre otras personas (Gruner, 1978). Y, la tercera teoría es la del Alivio como una acumulación de tensión que se alivia repentinamente, dando lugar a la respuesta de humor (Spencer, 1911). Estas teorías se combinan a menudo para producir numerosos subtipos de ideas que, como se indica claramente en la revisión realizada por Weinberg & Gulas (2019), al final, la situación

es de alguna manera caótica y repercute en la dificultad para entender estas teorías, así como en la dificultad para hacer la investigación.

Los estudios realizados son en su mayoría correlaciones entre mostrar el comportamiento humano y otros comportamientos y muestran un panorama muy diverso en muchos aspectos como las diferentes formas de medir el comportamiento del humor y un relato diverso de los resultados. Esto podría ser el resultado de la falta de consenso sobre las características del humor. Además, y quizás más importante, es la ausencia de estudios que se centren en las condiciones en las que surge el comportamiento humorístico.

En medio de la heterogeneidad de relatos sobre el comportamiento de humor, parece que hay algo de luz. Es la característica de incongruencia la que parece apuntarse como condición necesaria para generar la conducta de humor (Martin & Ford, 2018; McGhee, 1979; Morreall, 1983; Raskin, 1985; Ritchie, 2018). La incongruencia se define como la percepción de expectativas conflictivas que surgen al escuchar o leer el contenido de un chiste (Ritchie, 2004).

Aunque se discute con poca frecuencia en el análisis de la conducta, también se han hecho esfuerzos para entender el humor desde este punto de vista. Skinner (1957) mencionó varias veces el comportamiento humorístico en su libro *Verbal Behavior*. Describió muchas situaciones que pueden llevar a la gente a reír, como, la torpeza, la sorpresa, las distorsiones, las rimas rebuscadas, las metáforas, la diversión en el carácter, la exageración, la debilidad y las respuestas intraverbales inesperadas. Además, Skinner señaló en el contexto del refuerzo generalizado que una "broma que ha tenido un éxito especial es probable que se repita" (Skinner, 1957, p. 148). Michael, Palmer y Sundberg (2011) amplían aún más la teoría del control múltiple de Skinner en el contexto del uso de los juegos de palabras. Sugieren varias temáticas que podrían estar relacionadas con las respuestas críticas, incluyendo una fuente temática primaria y una o más fuentes secundarias. La respuesta crítica debe ser el elemento

(por ejemplo, palabra o frase) dentro del chiste que tiene múltiples fuentes de control. Esto estará relacionado con los efectos prácticos en la respuesta del oyente. La respuesta al humor suele estar determinada por las tendencias de respuesta que compiten entre sí. Imaginemos que Alfonso, María y Pedro siguen en el coche cuando el locutor cuenta otro chiste, "'Me encanta la sensación cuando puedo hacer que la gente se abra a mí', eso es lo que dijo el cirujano Mike, Jajaja" (short-funny.com). En este chiste, la frase "el cirujano Mike" es la respuesta crítica una vez que ésta se relaciona con el efecto práctico de superar el miedo (es decir, la variable temática) pero también con el hecho de tener que saltar obstáculos (es decir, una fuente secundaria de estimulación).

El relato funcional del lenguaje y la cognición propuesto por la teoría de los marcos relacionales (RFT) menciona las historias humorísticas como un tipo de relación específica entre las redes y las condiciones en las que éstas se completarán. Algunos indicios contextuales llevan al oyente a responder a la narración con un principio, un medio y un final, pero luego el oyente se da cuenta de que la historia no tiene fin, es una broma y no trata realmente de nada. El proceso básico del humor se define como "la mayoría de los chistes crean redes relacionales que son completas, significativas y coherentes pero incongruentes" (Stewart, Barnes-Holmes, Hayes y Lipkens, 2001, p. 83). La red de relaciones parece congruente y completa para el oyente hasta el remate. De forma repentina e inesperada (de ahí la metáfora del "*punch*""), la red se derrumba de forma incongruente y se reforma un momento después, de forma insólita y ridícula (Stewart et al., 2001).

Para ejemplificarlo, Stewart et al. (2001) ponen el ejemplo de la película Marry Poppins: "Un tipo le dice a otro: 'Hoy he conocido a un hombre con una pata de palo, llamado Smith'. Entonces, su amigo le responde: "¿Cómo se llamaba su otra pierna?". Se sugiere que la primera frase, "conocí a un hombre llamado...", se refuerza a través de una comunidad verbal completa con un nombre. El apellido "Smith" es un apellido conocido, y su presencia hace que

la relación convencional se cohesione: parece ser el nombre del hombre. Desde el punto de vista de la RFT, "hombre" y "Smith" están enmarcados en la coordinación, y tanto el contexto del nombre como el propio apellido son pistas contextuales para esa relación. Según este supuesto, "con pata de palo" está en relación jerárquica con "hombre". Cuando el otro hombre responde, sorprende al oyente e inicialmente parece una frase casi sin sentido. Como si se tratara de uno de una clase de nombres, preguntar por el otro nombre sirve de relación contextual para una relación diferente y dominante entre hombre, pierna y Smith. El nombre "Smith" está en una relación jerárquica con la pata de palo (es decir, forma parte del hombre). Esta resolución es técnicamente posible pero también incongruente. La red relacional se derrumba a partir de una historia que parece ser convencional, completa y coherente, pero también es inesperada e incongruente (Stewart et al., 2001).

La corriente principal de investigación sobre el humor dedicó una atención considerable a la comprobación de las condiciones de las teorías del humor, y la mayoría de los investigadores y teóricos realizaron perfeccionamientos en el nivel cognitivo-perceptual (Martin y Ford, 2018). Por ejemplo, en un estudio clásico que probó la hipótesis de incongruencia-resolución, Schultz (1974) analizó si la información en los chistes tiende a ser procesada en orden secuencial, detectándose primero la incongruencia y luego la información servirá para resolver la incongruencia. Los participantes fueron expuestos a una serie de chistes verbales o dibujos animados visuales, y luego informaron de la identificación del orden en que se dieron cuenta de los elementos. Los resultados mostraron que los participantes detectaron resoluciones implícitas después de la incongruencia en las caricaturas y los chistes, apoyando la hipótesis anterior. Más recientemente, Juckel et al. (2011) examinaron directamente la dinámica temporal de la apreciación del humor (es decir, la detección de incongruencias). Los participantes vieron una película de humor ("Mr. Bean") mientras llevaban una referencia digital en la cara para medir los movimientos de la frente y la boca. Los parámetros cinemáticos

permitieron la medición directa de la risa, y los resultados mostraron que los participantes se rieron tras el inicio del estímulo entre 500 y 3.000 ms aproximadamente. A pesar de las enormes diferencias individuales en la expresión facial, los autores sugieren que la incongruencia puede resolverse tan rápidamente como 500 ms.

Sin embargo, estos estudios no proporcionan las condiciones en las que se produce el comportamiento humorístico a nivel de historia personal. Por lo tanto, sigue sin responderse por qué una persona se ríe de un chiste. No habría humor si las características del encuadre relacional no condujeran a una relación derivada específica (Hayes y Hayes, 1989). Las respuestas de la relación derivada son el núcleo de las nuevas relaciones que surgen hacia uno mismo y de cómo se interactúa con los propios pensamientos, emociones y recuerdos que se actualizan en función del contexto. Sin embargo, ¿qué ocurre cuando la relación derivada se relaciona con otras relaciones?

Según la RFT, los pensamientos y las emociones de los individuos son autocontenidos o autorreglas. A lo largo del desarrollo de la comunidad verbal, han aprendido a entender, crear y seguir las reglas cuando adquieren fluidez en el encuadre. Las auto-reglas variarán a través de las contingencias culturales, dependiendo del contexto de cada individuo, la forma en que su comportamiento ha sido tratado, y cómo han aprendido a derivar (Luciano, 2017). La reacción al propio comportamiento (la función adquirida por las reglas derivadas o proporcionadas por otros) se ha denominado comportamiento gobernado por reglas, o regulación verbal. Una conducta gobernada por reglas, o regulación verbal, es la reacción a la propia conducta (es decir, las reglas derivadas o proporcionadas por otros adquieren una función), que funciona como un estímulo funcional que especifica antecedentes, acciones y consecuencias (por ejemplo, Skinner, 1969; Zettle y Hayes, 1982). Así, la regla es un producto individual que responde tanto a las múltiples interacciones con la comunidad verbal como a las contingencias naturales que un individuo encuentra durante su desarrollo.

En resumen, hemos visto el desarrollo del comportamiento relacional, y cómo el comportamiento relacional derivado influye en la aparición del humor. El humor es un comportamiento complejo que parece implicar redes relacionales completas, significativas y coherentes, pero que sin embargo son incongruentes (Stewart, Barnes-Holmes, Hayes y Lipkens, 2001). Dependiendo de la historia personal de relacionar los diferentes aspectos que puedan estar implicados en el contenido del chiste, se pueden derivar pensamientos y sentimientos que están, o no, en conflicto y, en consecuencia, podrían derivar en un comportamiento humorístico.

El capítulo 2 presentará el estudio empírico 1. En este capítulo, el impacto de tres elementos diferentes que podrían impedir la función humorística del chiste. Para ello, distribuimos esos elementos en tres protocolos experimentales para explorar las condiciones que podrían alterar la aparición del humor: *Reality* (invitando al participante como si estuviera en la situación descrita en el chiste), *Identification* (invitando al participante a adoptar la perspectiva de los personajes del chiste) y *Discomfort* (describiendo la incomodidad de los personajes del chiste). Sus efectos sobre el humor se midieron utilizando las respuestas faciales como indicador principal y los autoinformes como medida secundaria.

Participaron 23 estudiantes universitarios de habla hispana (14 mujeres; rango de edad de 21 a 33 años) a cambio de créditos de curso. Los participantes fueron asignados aleatoriamente a una de las dos condiciones. La secuencia experimental comenzó con una evaluación inicial, en la que los participantes tomaron medidas preexperimentales (por ejemplo, los cuestionarios AAQ-II, IRI-PT y STCI-S). El Cuestionario de Aceptación y Acción-II (AAQ-II Bond et al., 2011) mide la (in)flexibilidad psicológica reportada. A continuación, la Toma de Perspectiva, una escala del Índice de Reactividad Interpersonal (IRI, Davis, 1983; versión española de Escrivá, Frías, & Samper 2004) mide los intentos del sujeto por adoptar la perspectiva de otro en situaciones reales. Por último, las escalas de Alegría y

Seriedad *del State Trail Cheerfulness Invesntory* (STCI-S; Ruch, Kohler & van Thriel, 1997; versión en español de López Benítez, Acosta, Lupiáñez, & Carretero-Dios, 2017) miden si la persona está dispuesta a tomarse la situación de forma alegre o seria. Esta evaluación se utilizó para explorar si había alguna diferencia entre las condiciones y para analizar, en su caso, esas correlaciones. A continuación, el experimentador (que era el mismo para todos los participantes) explicó brevemente que el propósito del estudio era determinar cómo respondían las personas a diferentes contextos y tareas. También indicó que todas las instrucciones aparecerían en la pantalla del ordenador: "*Nuestras respuestas cambian según las circunstancias. A veces vemos una película y nos emocionamos, mientras que otras veces, no. A veces vemos algo y tenemos sentimientos de agrado o diversión, mientras que otras veces, sentimos aburrimiento, molestia, dolor o incomodidad. En este estudio, tratamos de investigar cómo respondemos a diferentes situaciones. No hay respuestas correctas o incorrectas. Cualquier cosa que responda estará bien. Le rogamos que preste atención y responda con sinceridad*".

En la fase 1, a los participantes de la condición de control se les presentaron cuatro chistes, empezando por el del Médico, seguido por el de la Cerveza, el del Trabajo y terminando con el del Fútbol. En la condición experimental, también se presentaron los mismos cuatro chistes, pero los tres primeros fueron precedidos por el protocolo experimental respectivo (es decir, los protocolos de *Reality*, *Identification* y *Discomfort*). Los protocolos de *Reality* añadían pistas contextuales para situar al participante en la situación del chiste (por ejemplo, "*Por favor, imagine que está en un hospital... que lo que está escuchando es real como si estuviera ocurriendo en este momento*"). A continuación, el protocolo de *Identification* pretendía invitar al participante a adoptar la perspectiva del personaje del chiste (por ejemplo, "*Va a leer algo sobre alguien llamado Juan. Te pedimos que intentes imaginar que eres él*"). Por último, se aplicó el protocolo de *Discomfort*, indicando una situación en la que el personaje de la broma

estaba en un mal momento (por ejemplo, "*Ahora vas a ver una entrevista de trabajo. Se trata de entrevistadores que se ríen de la gente y montan entrevistas falsas para reírse de los candidatos*"). Después de presentar los tres chistes manipulados, el cuarto chiste (el chiste del Fútbol) se presentó sin manipulación. A continuación, se invitó a todos los participantes a un descanso de 10 minutos, tras el cual pasaron a la segunda fase del experimento. En ambas condiciones, esta fase presentaba los cuatro chistes sin manipulación en el mismo orden que en la primera parte (es decir, Médico, Cerveza, Trabajo y Fútbol).

Los resultados obtenidos pueden resumirse como sigue. En primer lugar, cuando a los participantes se les presentaron los chistes por primera vez, los de la condición Control sonrieron y calificaron el chiste de gracioso. Este resultado se da en todos los chistes, lo que replica estudios anteriores en los que estos chistes fueron evaluados como graciosos en este tipo de población universitaria. En cambio, los resultados de la condición Experimental mostraron que los protocolos experimentales produjeron efectivamente cambios consistentes y replicables en la forma en que los participantes respondieron a los chistes. En concreto, los participantes no sonrieron ni calificaron el chiste de gracioso cuando se aplicaron los protocolos de *Reality* y *Discomfort*, mientras que se obtuvo un efecto variable cuando se aplicó el protocolo *Identification*. Cuando se presentaron los chistes por segunda vez en la Fase 2, los participantes en ambas condiciones redujeron las respuestas de sonrisa, sin que hubiera diferencias significativas entre las condiciones (excepto para el chiste de Fútbol). Estos hallazgos podrían indicar que la reexposición a los chistes (incluso siendo la primera vez sin ninguna manipulación, como en la condición experimental) impactó en la risa. Estos resultados podrían analizarse teniendo en cuenta el intervalo relativamente corto entre las dos exposiciones al chiste. Intervalos más largos podrían hacer que no se redujeran las respuestas de humor.

Para concluir, este trabajo constituye un primer estudio exploratorio que muestra la alteración de las respuestas de humor cuando se aplican los protocolos *Reality* y *Discomfort*, y en menor grado con el protocolo *Identification*, lo que a su vez podría ser útil para responder a nuestra pregunta original de por qué un chiste produce humor a una persona. El estudio no se diseñó para comparar estos tres protocolos entre sí, sino para analizar cada uno de ellos en el contexto de un chiste sin protocolos. Además, el estudio no fue diseñado para aislar los procesos involucrados en cada uno de estos protocolos cuando alteran las funciones que típicamente generan el chiste. En definitiva, las conclusiones deben considerarse con cautela y se necesitan réplicas. Las investigaciones futuras se centrarán en aclarar los papeles funcionales del encuadre de la perspectiva como procesos implicados en el cambio de las funciones de las redes de los chistes, ya sea para prevenir o para promover la aparición del comportamiento humorístico. De esta manera, la incongruencia que se ha defendido en la literatura del humor podría destilarse en los procesos relacionales implicados en el comportamiento de humor.

El *Capítulo 3* presentará el estudio empírico 2 y ampliará los hallazgos del estudio anterior que quedaron sin respuesta. Este estudio pretendía incluir explícitamente todas las funciones relacionales que podrían afectar a la aparición del comportamiento humorístico. Se centró en el papel funcional del encuadre deíctico con funciones de malestar como procesos psicológicos implicados en el cambio de las funciones de las redes relacionales involucradas en los chistes. La RFT ha dado cuenta de la toma de perspectiva (TP) como marcos relacionales deícticos: interpersonales (yo *frente a* ti), espaciales (aquí *frente a* allí) y temporales (ahora *frente a* entonces). La investigación reciente sobre el encuadre deíctico mostró que cuando se introduce la perspectiva de los demás impacta en la propia perspectiva (por ejemplo, McHugh, Barnes-Holmes, & Barnes-Holmes, 2004; Villate et al., 2012; Barbero-Rubio, et al., 2016). Además, la evidencia ha demostrado que una vez que un estímulo adquiere una función, la función de los estímulos relacionados con él se transforma dependiendo del tipo de relación

que se establezca con ellos (And & Roche, 2015; Dymond & Barnes, 1995, 1996; Dymond & Fergunson, 2007; Dymond, Roche, Forsyth, Whelan & Rhoden, 2007, 2008; Rodríguez-Valverde, Luciano, & Barnes-Holmes, 2009; Stewart, Hooper, Walsh, O'Keefe, Joyce, & McHugh, 2015; Whelan, Barnes-Holmes & Dymond, 2006).

Para ello, se mezclaron ambos elementos para alterar las respuestas de humor; es decir, enmarcando todos los chistes en un protocolo que incluye marcos de perspectiva de Yo-Aquí-Ahora con funciones de incomodidad. Además, aislaremos el impacto de las funciones de perspectiva o de malestar en las respuestas de humor a los dos chistes. Paralelamente, para evitar los efectos de arrastre de la presentación de todos los chistes a los mismos participantes, incluiremos otra forma de perturbar la red relacional implicada en los chistes mediante la desliteralización de las funciones de algunas palabras del chiste (Masuda et al., 2004; Valdivia et al., 2006; Masuda et al., 2008).

Para lograr estos objetivos, este estudio pretendía comparar el efecto de cuatro protocolos en las respuestas de humor utilizando los mismos cuatro chistes del estudio anterior (es decir, los chistes del Médico, de la Cerveza, del Trabajo y del Fútbol). Se realizaron dos experimentos con seis condiciones para alterar las respuestas de humor de los chistes. El experimento 1 incluía dos protocolos en una de las dos condiciones. En concreto, dos chistes fueron precedidos por (1) un protocolo que invitaba al participante a adoptar la perspectiva de los personajes del chiste que se sienten incómodos en la situación de dos chistes; y un chiste (2) incluía la adición de palabras, letras y colores, así como la alteración del tiempo y el orden de las frases. El segundo experimento parte del primero, incluyendo los mismos protocolos para diferentes chistes y añadiendo dos protocolos que consistían en (3) invitar al participante a adoptar la perspectiva de los personajes de dos chistes; (4) y describir una situación en dos chistes en la que los personajes del chiste sienten incomodidad. Con ello, en el Experimento 2, dos chistes recibieron tres protocolos diferentes. Sus efectos sobre el humor se midieron

utilizando las respuestas faciales como indicador principal y los autoinformes como medida secundaria.

En el Experimento 1, veinte estudiantes universitarios (13 mujeres; rango de edad = 18-40 años) que asistían a diferentes cursos de la Universidad de Almería participaron en el experimento. La secuencia experimental fue idéntica a la descrita anteriormente en el capítulo 2. En primer lugar, los participantes respondieron a los cuestionarios (es decir, AAQ-II, IRI y STCI-S). Luego, los participantes fueron asignados al azar a una de las dos condiciones: *Control* y *Mix Control Desl*.

Los cuatro chistes y las actividades intermedias se utilizaron tanto en la condición *Control* como en la condición *Mix Control Desl*, y sólo se diferenciaron en la presentación de los protocolos experimentales en esta última. En la condición *Control*, se presentó a los participantes en primer lugar el chiste sobre el fútbol, seguido del chiste sobre el trabajo, y a continuación los chistes sobre la cerveza y el médico. Todos los chistes y actividades se mostraron en la pantalla del ordenador, con una pantalla gris que separaba la presentación de cada chiste y la presentación de las actividades intermedias. En la condición *Mix Control Desl*, el protocolo *Mix* se presentó antes de la broma Fútbol (por ejemplo, "*Intenta imaginar durante unos minutos que eres José... y que estás jugando un partido de fútbol contra Marcos... Sois rivales...*") y la broma del Trabajo (por ejemplo, "*Ahora vais a ver una entrevista de trabajo. Son entrevistadores que se ríen de la gente y montan falsas entrevistas para reírse de los candidatos (...) Te pedimos que intentes ponerte en la piel de la persona que vas a entrevistar...*"). A continuación, se presentó el chiste de la Cerveza sin ninguna manipulación, y el protocolo de *Desliteralization* se presentó antes del chiste del Médico. Al igual que en la condición anterior, se presentaron actividades entre los chistes. Tras la presentación del cuarto chiste en cada condición, la pantalla del ordenador indicaba que el experimento había concluido y se informaba a los participantes.

Los resultados indicaron que los chistes produjeron una respuesta de humor para casi todos los participantes en la condición de *Control*, pero que cuando se manipularon con los protocolos experimentales, produjeron menos sonrisas y fueron considerados como menos divertidos. Este efecto es más evidente para los chistes Fútbol y Médico (protocolos *Mix* y *Desliteralization*, respectivamente), y en menor grado para el chiste Trabajo (protocolo *Mix*).

Con el mismo objetivo del Experimento 1, en el Experimento 2 expusimos a los participantes a dos condiciones equivalentes del primer experimento, salvo que el orden de los chistes era diferente. Además, aislamos los dos elementos de los protocolos *Mix* y generamos dos protocolos diferentes: los protocolos *Discomfort* e *Identification*. Así, los protocolos de *Mix*, *Discomfort* e *Identification* se aplicaron a los dos mismos chistes, con el fin de comparar los diferentes efectos en las respuestas de humor. Por último, el protocolo de *Desliteralization* también se aplicó a diferentes chistes.

Se reclutaron 38 estudiantes universitarios (26 mujeres; rango de edad = 18 - 37 años), se les compensó por su participación y se les informó como en el Experimento 1. El experimento se realizó de forma idéntica al Experimento 1.

Las condiciones del Experimento 2 también recibieron cuatro chistes con actividades intermedias, pero difieren del Experimento 1 en el orden de los chistes. Las condiciones *Control* y *Mix Control Desl* presentaron en primer lugar los chistes del Médico y de la Cerveza, seguidos de los chistes del Trabajo y del Fútbol, y las condiciones *Disc Control Desl* e *Id Control Desl* sólo cambiaron el orden de los dos últimos chistes (es decir, terminaron con los chistes sobre el fútbol y el trabajo). Los protocolos de *Mix*, *Discomfort* e *Identification* se expusieron por separado en tres condiciones diferentes, precediendo a los mismos chistes de Médico y Cerveza. A continuación, se expuso un tercer chiste sin ningún protocolo, seguido del último chiste con el protocolo de *Desliteralization*.

Los resultados indicaron un patrón similar al del Experimento 1, en el que los participantes en la condición de *Control* mostraron un mayor porcentaje de sonrisas y de reportar los chistes como graciosos que los participantes expuestos a la condición con protocolos experimentales (es decir, protocolos de *Mix* y *Desliteralization*). Estos protocolos redujeron la sonrisa y el reporte de gracioso en casi todos los participantes expuestos a ellos.

Los datos de los protocolos de *Discomfort* e *Idenfication* revelaron que la sonrisa y el reporte de los chistes como graciosos de los participantes fue menor a los mismos chistes en la condición de *Control*. Si se observan las respuestas faciales y los autoinformes en estos protocolos, apuntan a direcciones diferentes en los participantes, lo que resulta en una mayor no correspondencia de las medidas. En los dos últimos chistes, los datos muestran un patrón similar en la presencia de la sonrisa y el informe divertido cuando el chiste no tiene protocolos y para el chiste manipulado con el protocolo de *Desliteralization*.

En conclusión, este estudio añade evidencia empírica del impacto de los deícticos Yo-Aquí-Ahora con funciones de incomodidad en la alteración de la derivación del humor. Los resultados mostraron que principalmente dos protocolos fueron efectivos: (1) el llamado protocolo *Mix* estableció un contexto a los cuatro chistes al enmarcar el deíctico de Aquí-Ahora con funciones de incomodidad; y (2) el protocolo *Desliteralization* añadió nuevas funciones en la red de chistes. Se anima a que otros estudios sobre el humor reproduzcan esos elementos y los modifiquen para explorar el potencial de los diferentes elementos, ya sea para prevenir o promover la aparición del humor (por ejemplo, ¿cuál podría ser el caso al cambiar el encuadre deíctico a Otro-Aquí-Ahora con funciones apetitivas?) El presente estudio contribuye a comprender los elementos que pueden estar presentes cuando alguien no sonríe ante un chiste.

Por último, en el *Capítulo 4* se describen las aportaciones de la presente tesis y se discuten las implicaciones de los resultados obtenidos, que hacen hincapié en la comprensión

del papel de los deícticos Yo-Aquí-Ahora con funciones de incomodidad en la alteración de la

derivación del humor. Se discuten las limitaciones y la propuesta para futuros estudios.

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CHAPTER 1: INTRODUCTION

This chapter presents the context of humor behavior and the empirical evidence that supports it. *Humor* as a topic that has been increasingly investigated in recent years within psychology and therapy. The humor behavior chapter starts by how humor behavior has been explored and giving an example from everyday life. Then, a brief overview about humor is presented, beginning with a flight from the literature of humor and ending with the functional perspective. Finally, through the review of existing empirical research, this chapter discusses how the functional approach to language and cognition, the Relational Frame Theory, can approach humor behavior. This will enable us to set the context for the empirical work of this thesis.

1.1. Humor behavior and how it has been explored.

Humor behavior is a *complex social behavior* that is a relevant part of human condition that has been a relevant aspect since early one in the literature. For instance, philosophers point to comic and laughter (the term humor associated to laughter were introduced by the end of 17th century, see Ruch 2008) since very early age and related to many other aspects of human activities. For instance, Aristoteles believed that the laughter occurred as a response to ugliness or deformity in another person (Martin & Ford, 2018, p. 21). Immanuel Kant situated that the essence of humor in the evaporation of an expectation (Morreal, 1987), and stated that "laughter is an affection arising from sudden transformation of a strained expectation into nothing" (quoted in Morreal, 1987). While for Schopenhauer, "the cause of laughter in every case is simply the sudden perception of the incongruity between a conceptual and the real objects which gave been thought through it in some relation, and laughter itself is just the expression of this incongruity" (quoted in Morreal, 1987, p. 52).

Humor behavior is shown in many different ways although typically it can be observed commonly through someone's laughter at something, typically to so-called jokes. Humor is an

important social factor, in which people smile or laugh more with members of the in-group (Platow, 2005), it builds a group identity (Robinson & Smith-Lovin, 2001), and can create feelings of closeness in meetings with strangers who laugh and share their sense of humor (Fraley & Aron, 2004). It has been found that laughter occurs on average eighteen times per day in many different circumstances (Martin & Kuiper, 1999) as, for instance, on social media, TV, books, newspapers, listening in joke-programs, as well as daily social interactions. That is, it is an important part of our social daily activities with importance implications in many domains. One area in which humor behavior has shown to be beneficial is in promoting psychological health. In this respect, studies have linked humor to benefits in, among others, promoting a better recovery after physical illness (Peterson, Park, & Seligman, 2006); enhancing happiness in positive psychology interventions (Wellenzohn, Proyer, & Ruch, 2016); in improving emotional regulation (Samson & Gross, 2012); and enhancing friendly and collegial relationships in the workplace (Holmes & Marra, 2002).

The relevance of the literature pointing to the benefits provided by humor behavior, across several domains, mainly, psychological health, is an important step although it does not permit to understand the conditions given rise to this complex behavior. Several problems emerge when approaching the analysis of such behavior. On the one hand, there is a lack of consensus in conceptualizing as well as in defining and measuring its particulars. On the other hand, the research conducted towards the analysis of the conditions for human response to occur is absent. In other words, the experimental analysis of humor response is still a horizon to be explored. Our interest in this thesis is connected to the latter point. Consequently, let us start the next section with a humorous example from our daily life.

1.2. An Example of Humor Behavior

Imagine that Alfonso, Maria, and Pedro, their six-year-old son, are in the car. They are listening to the radio when the broadcaster says: "I am going to read a joke that came to us by e-mail, please listen to this…. Just listen… A surgeon says to a patient in the surgery room: 'Relax David, it is just a small surgery. Don't panic'…. Surprised, the patient says, 'hey! surgeon, my name is not David' while the surgeon quietly responds, 'Yes! I know. I am David.'" Alfonso laughs while the broadcaster starts to play a song. However, Maria takes it as nonsense, whereas Pedro ignores what he had just heard.

How and why do these different responses arise? Perhaps, we might ask Maria about the reasons for her not having laughed. A simple answer for Maria might be "because it was not funny for me." We may also ask Alfonso the same question and he might answer, "that is the kind of joke that I like." When we ask Pedro, he may not respond. However, his parents might say, "it is because he is too young to understand this joke." Taking into account each of the reasons that each of the persons might have derived to explain the presence or absence of funny responding to the "joke", the main question remains. It is the following: Under which conditions does humor response occur? In the part of the chapter, a brief account of humor behavior is presented.

1.3. A brief overview of Humor behavior

The core experience of humor behavior is responding to something as funny (Ruch, 2008). Inevitably, as we have shown in the previous paragraph, and like any other human experience, this behavior shows variability. In some cases, one person might respond laughing and expressing that the joke is a conjoint of different ideas that are funny for him. In another case, a person might understand the joke, however s/he does not find it funny (Ritchie, 2018). In another case, it might not even notice as a joke. Why does variability comes from? To make things perhaps more difficult, an answer should be need not only in regard the understanding

of the joke given by others but it should be needed to know the conditions under which some persons invent jokes that then are funny, or not, for others. In other words, some people have the ability to make joke and not everyone who understands the joke given by other will find it funny as well as not all the people who find it funny react smiling or producing similar responses. In the next paragraphs, a general overview is presented.

As indicated previously, humor has been considered a language-based skill that is experienced across cultures, and it is an important attribution of human behavior (Apte, 1985; Lefcourt, 2001). However, the commonality of humor mostly stops there. The cognitive account of humor is the most frequent conceptualization on humor and has given an extensive number of studies and theories that falls into three broad categories (Weinberg & Gulas, 2019; Martin & Ford, 2018). One is that focused on Cognitive-Perceptual as the perception of two typically disparate ideas that cause humor responses (Suls, 1972). The second one is that focused on Superiority as a form of aggression that one feels over other people (Gruner, 1978). And, the third theory is the Relief as a buildup of tension that is suddenly relieved, resulting in humor response (Spencer, 1911). These theories are often combined to produce numerous sub-types of ideas that, as clearly stated in the review done by Weinberg & Gulas (2019), at the very end, the situation is somehow chaotic and impact in the difficulty to understand these theories as well as in the difficulty for doing research.

The studies conducted are mostly correlations between showing human behavior and others behaviors and show a very diverse panorama in many respects as the different ways of measuring humor behavior and a diverse account of the results. This might be a result of the lack of consensus about the characteristics of humor. In addition, and perhaps more importantly, it is the absence of studies that are focused in the conditions under which humor behavior emerges.

In the middle of the heterogeneity of accounts of humor behavior, it seems that there is some light. It is the incongruity characteristic that seems to be pointed as a necessary condition to generate humor behavior (Martin & Ford, 2018; McGhee, 1979; Morreall, 1983; Raskin, 1985; Ritchie, 2018). Incongruity is defined as the perception of conflicting expectations arising when hearing or reading the contents of a joke (Ritchie, 2004). For instance, in the abovementioned joke, the surgeon/patient joke might have been funny to Alfonso because perhaps according to his history, he would not be expecting a surgeon to say himself, in the presence of the patient: "Relax, don't panic," or perhaps, the person listening the joke has suffered a surgery, or someone he loves, or his ideas about health are something that are so serious to make of it.

Knowing the different personal history that bring the functions of the rules or networks that are established in the individual history is not a simple task. Contrary is one of the big stones in doing experimental studies with human beings. For example, "incongruity," is also designated by other authors as a "bisociation" (Koestler, 1964) or "cognitive shift" (Latta, 2011) or "juxtaposition" (Warren & McGraw, 2016), or "double-meaning" (Jackson et al., 2021). In addition, "incongruity" can also be described as unexpected, threatening, or simultaneously holding conflicting ideas, according to the benign violation theory (a sub-type of humor theory, see McGraw & Warren, 2010). Consequently, the features of humor conceptualization described in different terms, and the measures of humor with different dimensions (see below), prevent a precise comprehension and interpretation of the results obtained across studies. Given such panorama, we will go through the conceptualization of incongruity and humor behavior from a functional behavioral perspective in order to organize the analysis of this behavior. Incongruity has also been taken into account when approaching humor behavior from a functional behavioral perspective. Though infrequently discussed in

behavior analysis, efforts to understand humor from this view have also been made, as presented in the following section.

1.4. Humor Behavior from a Functional Perspective

Skinner (1957) did mention humor behavior several times in his book *Verbal Behavior*. He described many situations that can lead people to laugh, such as awkwardness, clumsiness, surprisingness, distortions, far-fetched rhymes, metaphors, amusement in character, exaggeration, weakness, and unexpected intraverbal responses. In addition, Skinner pointed out in the context of generalized reinforcement that a "joke which has been particularly successful is likely to be told again" (Skinner, 1957, p. 148). Michael, Palmer, and Sundberg (2011) further extend Skinner's theory of multiple control in the context of using puns. They suggest several thematics that might be related to critical responses, including a primary thematic source and one or more secondary sources. The critical response should be the element (e.g., word or phrase) within the joke that has multiple sources of control. This will be related to practical effects on the listener's response. Humor response is typically determined by competing response tendencies. Let us imagine Alfonso, Maria, and Pedro still in the car when the broadcaster tells another joke, "'I love the feeling when I can make people open up to me', that's what the surgeon Mike said, *Hahaha*" (short-funny.com). In this joke, the phrase "the surgeon Mike" is the critical response once this is related to the practical effect of moving past the fear (i.e., thematic variable) but also related to the fact that one has to jump over hurdles (i.e., a secondary source of stimulation).

Epstein & Joker (2007) did not emphasize the "incongruity" component but suggested a "threshold theory" of humor. They assert that a joke's set-up is an establishing operation that leads to converting verbal or perceptual responses. The humor response occurs when the punchline, or trigger, raises this response above the threshold of awareness. Following the

previous example, imagine that the broadcaster is still telling jokes, "now, a joke for children, 'what do you call a toothless bear?...'" This set-up is not funny per se, and there is no humorous response at that moment, but it may serve as a motivating operation that strengthens some covert responses below the threshold of awareness (e.g., gums). When the broadcaster then says, "'...gummy bear!'" this punchline will immediately push these responses to the conscious level, eliciting laughter in the audience.

The functional account of language and cognition proposed by Relational Frame Theory (RFT) mentions humorous stories as a kind of specific relation between networks and the conditions under which the networks will be completed. Some contextual cues lead the listener to respond to storytelling with beginning, middle, and end, but then the listener realizes that there is no end to the story, it is a joke, and it is not truly about anything. The basic humor process is defined as "most jokes create relational networks that are complete, meaningful, and coherent but incongruous" (Stewart, Barnes-Holmes, Hayes, & Lipkens, 2001, p. 83, 2001, p. 83). The related network seems congruous and complete to the listener until the punch line. Suddenly and unexpectedly (thus the metaphor of a "punch"), the network collapses incongruously and then reforms a moment later, unusually and ridiculously. In RFT terms, explaining a complex behavior such as humor requires understanding how individuals derive relations among events and how they respond to their derivations. This will be presented in the next section.

1.5. The Relational Functional Approach of Humor

RFT states that human beings learn to relate objects to each other and derive them without explicit training through contextual cues approved and created by the verbal community. This behavior is named derived relational behavior and is an operant behavior learned through multiple exemplar training (MET) of a set of instances that enable one to

interact with a novel stimulus in terms of another stimulus. The different types of relational responding, named relational framing, are described as coordination ("is," "same as"), opposition ("is opposite to"), distinction ("different"), comparison ("better/worse than"), condition ("if… then"), hierarchical ("include," "contain," "part of") and deictic (I–you, here–there, now–then) (Hayes, Barnes-Holmes, & Roche, 2001).

Relational frames involve mutual (e.g., if A is related to B, then B is related to A) or combinatorial (e.g., if A is related to B, and B is related to C, then A is related to C) events and objects based on the arbitrarily established contextual cues that specify the relational pattern of the frame (i.e., if A is the same as B, and B is the opposite to C, then A and C are opposite). Once generating fluency and flexibility in relational framing is acquired, the way that we interact with the environment—the meanings of events and objects—influences our behavior, and it becomes transformed in us (e.g., if A is "serious," the functions of seriousness established for A will now transfer to B, but not to C) (Hayes et al., 2001). These features of framing combine to form networks (stories) that, in turn, can be combined in a more complex way, as in jokes (Stewart et al., 2001, p. 82).

As has been defined, "most jokes create relational networks that are complete, meaningful, and coherent but incongruous" (Stewart et al., 2001, p. 83). For instance, let us consider that Alfonso tells Maria a joke from the movie Mary Poppins, "One guy says to another, 'I met a man today with a wooden leg, named Smith.' So, his friend replies, 'What was the name of his other leg?'" It is suggested that the first sentence, "I met a man named…," is reinforced via a verbal community complete with a name. The last name "Smith" is a well-known surname, and its presence makes the conventional relation cohere—it seems to be the man's name. From the lens of RFT, "man" and "Smith" are framed in coordination, and the naming context and last name itself are both contextual cues for that relation. According to this assumption, "with a wooden leg" is in hierarchical relation with "man." When the other man

responds, it surprises the listener and initially appears to be almost a nonsense sentence. As if it is one in a class of names, asking for the other name serves as a contextual relation for a different and dominant relation between man, leg, and Smith. The name "Smith" is in a hierarchical relation with the wooden leg (i.e., it is part of the man). This resolution is technically possible but also incongruous. The relational network collapses from a story that appears to be conventional, complete, and coherent, but it is also unexpected and incongruous (Stewart et al., 2001).

So far, we have seen the complexity of humor behavior and the different perspectives that approach it. However, much of the work in behavior analysis is conceptual and not yet empirical. The empirical context of humor research will be presented in the next section.

1.6. The Empirical Research of Humor Behavior

The mainstream humor research devoted considerable attention to testing the conditions of humor theories, with most of researchers and theorists making refinements in the level of cognitive-perceptual processes (Martin & Ford, 2018). For example, in a classical study that tasted incongruity-resolution hypothesis, Schultz (1974) analyzed whether the information in jokes tends to be processed in sequential order, with incongruity being detected first and then the information will serve to resolve the incongruity. Participants were exposed to a series of verbal jokes or visual cartoons, and then they reported identifying the order in which they noticed the elements. The findings showed that participants detected implicit resolutions after incongruity in the cartoons and jokes, supporting the previous hypothesis. More recently, Juckel et al. (2011) directly examined the temporal dynamics of humor appreciation (i.e., incongruity detection). Participants watched a humorous movie ("Mr. Bean") while they were wearing a digital reference on their face to measure the movements of the forehead and mouth. Kinematical parameters allowed direct measurement of laughter, and the findings showed that

participants laughed after the stimulus onset between approximately 500 and 3,000 ms. Despite the vast individual differences in facial expression, the authors suggest that incongruity can be resolved as quickly as 500 ms.

Another type of humor research has been focused in comparing concepts and trying to figure out which condition is more or less central to explain the entirety of humor behavior (Warren et al., 2020). For instance, a classical study by Schultz and Horibe (1974) compared whether amusement with verbal jokes depends on the perception of incongruity and the resolution of incongruity. In this study, jokes were presented to group of children's with 6, 8, 10, and 12 years old in three different ways: (1) the original joke, without any alteration (e.g., The one: "Call me a cab", the other "you are a cab") ; (2) the incongruity-removed jokes, where incongruity of the joke did not appear (e.g., the one: "Call a cab for me", the other "you are a cab" (3) the resolution-removed joke, where the resolution was not exposed (e.g., the one "call me a cab", the other "yes, ma'am"). They recorded and measured children's appreciation of the joke on three levels (0= no response, 1=inhibited or slight smile, 2= full smile, and 3= laugh). The findings showed that children 8, 10, and 12 years found the original jokes funnier than the other two versions. Thus, incongruity without resolution is funnier than no incongruity, but incongruity and resolution in funniest (Schultz & Horibe, 1974). However, the results were analyzed at the group level (each group had 15 children) and did not show individual data. So, could there have been variability between individuals? That is, a 6-year-old might have found the joke original, while an 8-year-old might not? If so, why did this happened?

Despite the advances in humor research and theorists, there are no experimental studies on the individual history level. In an attempt to approach the individual differences in humor behavior, many studies have been devoted to developing humor questionnaires. For example, the State Trait Cheerfulness Inventory (STCI-S; Ruch et al., 1996) was developed to examine the sense of humor (i.e., the frequency with which people smile or laugh during the day), and

it was correlated to the state of well-being (López-Benítez et al., 2017). However, the practice of self-reports (e.g., using a Likert scale for participants to rate how funny a specific joke was or how they felt after listening to a joke) has been found troublesome in different areas, as it relies on the assumption that there is a correspondence between what the participant reports and what they do, but these two behaviors do not necessarily go together (e.g., Critchfield, Tucker, & Vuchinich, 1998; Perone, 1988; Shimoff, 1986; see for a review, Cabello & O'Hora, 2002). In the case of humor, the actual behavior of laughing or smiling[1] when a joke is presented might or not be equivalent to reporting the impact of a joke in a subsequent moment. Accordingly, when the joke is presented, selecting facial responses as the primary measure seems an objective measure, rather than reporting the identification of humor responses, even when both measures might agree as parts of the same class.

However, even with different conceptualizations of the conditions under which humor behavior occurs, humor interventions have been addressed to teach children without this repertoire. For example, Perscike et al. (2013) taught three children with ASD to detect and respond to sarcasm (i.e., smiling or stating a reciprocal sarcastic comment). The interventions consisted of three phases: (1) participants received rules (e.g., "when someone says the opposite of what they mean, they are probably being sarcastic") and videos (e.g., a video recording presented a child riding a skateboard at an excessively slow pace and the sarcastic comment was, "Wow, he is going really fast" with the experimenter commenting "this is being sarcastic") across multiple exemplars; (2) in vivo training that consisted of a conversation between participant and therapist with sarcastic and sincere comments throughout the session (e.g., "worms would taste so good!" and "I would never eat worms" for sarcastic and sincere comments, respectively); and (3) post-training and follow-up sessions with an identical

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[1] Ruch (1993) suggested that smiling is a preferable term for studying humor when investigated in the laboratory.

procedure to phase 1, which included novel sarcastic comments. The findings showed that all three participants detected and responded appropriately to sarcastic comments (i.e., the participants continued a natural conversation according to the therapist's sarcastic or not sarcastic comments) at the three-month follow-up and were able to generalize the behavior with novel people settings, and exemplars.

In another study conducted directly to teach humor behavior, Jackson et al. (2021) also used multiple exemplar training to teach double-meaning jokes to four typical developmental children who did not demonstrate this skill. The intervention used jokes, in which one word could mean different things (e.g., "why was 6 afraid of 7? Because 7 *ate* 9"), and non-jokes with only one literal meaning (e.g., "what sound does a dog male? Woof woof"). Results indicated that all participants demonstrated generalized humor comprehension and appreciation (i.e., smiling/laughing at the joke) at a two-week follow-up.

Although these two studies suggest specific behavioral procedures to teach humor using multiple exemplar training with children like Pedro, they do not provide an understanding of the conditions in which humor behavior occurs. Thus, why one person laughs at a joke remains unanswered. In the following section, we will address more specifically how the above-mentioned contributions of the RFT might be applied to humor behavior.

1.7. How relational responding might be useful to approach humor?

There would be no humor if the features of relational framing did not lead to a specific derived relation (Hayes & Hayes, 1989). The derived relation responses are the core for the new relations that emerge to oneself and how one interacts with one's own thoughts, emotions, and memories that get updated depending on the context. However, what happen when the derived relation is related to other relations? Following the example of Alfonso and Maria in the car listening to the radio, both, as any other sophisticated verbal individual, have learned to

relate networks since their childhood. For example, imagine that Alfonso's parents like jokes and used to tell him some puns, such as "'Why was six afraid of seven? Because seven *ate* nine.'" Given that Alfonso already had an understanding about numbers, and the relationship between actions and feelings, relating relations transformed the meaning of the conventional network in an incongruous way that is reinforced in the parent–child interaction. Besides, Alfonso might start to produce humorous stories with his parents (Jackson et al., 2021; Persicke, 2013). For instance, on their way home from school, Alfonso answered his father's question about how the class went with "well, the teacher told the Dumbo story… it was *irrelephant*." Both laughed. That is, the pun intended for his father by Alfonso was reinforced in shared amusement. Thus, when he heard the broadcaster telling the joke, his own coherence of MET in relation to jokes may have stimulated a thought like "that was a good one." In contrast, if Maria learned that "it is not correct to make jokes about people" and "there is a limit to making jokes about people," then she probably directly or indirectly reacted to these thoughts when she listened the joke. That is, perhaps she had thoughts like "the broadcaster is so irresponsible," and "this would be a problem for the patient," and more broadly "health is a serious issue." Alfonso and Maria's interaction with their own private history is key to understanding the development of the emergence of humor, and so it will be described in more detail.

According to RFT, Alfonso and Maria's thoughts and emotions are self-contents or self-rules. Throughout the development of the verbal community, they have learned to understand, create, and follow the rules when they become fluent in framing. Self-rules will vary across cultural contingencies, depending on the context of each individual, the way their behavior has been treated, and how they have learned to derive (Luciano, 2017). Reaction to one's own behavior (the function acquired by the rules derived or provided by others) has been called rule-governed behavior, or verbal regulation. A rule-governed behavior, or verbal regulation,

is the reaction to one's own behavior (i.e., the rules derived or provided by others acquire a function), which works as a functional stimulus that specifies antecedents, actions, and consequences (i.e., Skinner, 1969; Zettle & Hayes, 1982). Thus, the rule is an individual product that responds both to multiple interactions with the verbal community and to the natural contingencies that an individual encounters during their development. For instance, if Maria reacts to feelings of discomfort while listening to the joke, then she might imagine that bad consequences will happen because "health is a serious issue." Now, when Maria is in the car listening the joke, it is likely (and coherent) that she derives that "if it was a real patient, he would die" and "it is terrible what they did." Thus, the content about the joke emerges in Maria as the function of the dominant self-rules. For Maria, the "joke" in the surgery room is coherent, meaningful, and complete according to her dominant self-rule, but not incongruent.

Conversely, Alfonso must also have derived rules, even though he may have thought "the patient is going to die," but in his relational framing repertoire, flexibility in deictics—the ability to adopt different perspectives according to context and arbitrary cues—might play an important part in making the joke work. Deictic framing has been identified as being a central factor of the process responsible for the formation of thoughts and emotions (Hayes et al., 2001; Törneke, 2017; Luciano et al., 2020). In the first joke of the surgery room, the humor function emerges when, through the perspective-taking of I/other, here/there, and now/then, Alfonso notices that the patient is not going to die. In other words, through the I-there-then deictic framing, the listener notices that the surgeon does not fulfill the functions of the safety and seriousness network, but another that is nonsensical. It seems that given this ability to include perspective in the medical network, one can relate other relations besides the safety and seriousness function of the conventional medical network, resulting in something that is humorous. Thus, Alfonso's reactions to noticing (here/now) the joke (there/then) allow him to

transform the meaning of the complete, coherent, but incongruent network. The joke is funny, and Alfonso smiles.

To sum up, we have seen the development of relational behavior, and how the derived relational behavior influences the emergence of humor. Humor is a complex behavior that seems to involve complete, meaningful, and coherent relational networks, but which are nevertheless incongruous (Stewart, Barnes-Holmes, Hayes, & Lipkens, 2001). Depending on the personal history of relating the different aspects that might be involved in the content of the joke, one can derive thoughts and feelings that are, or are not, in conflict and, consequently, might derive in humor behavior.

1.8. Conclusion and Aims of this thesis

The purpose of this chapter was to provide the humor behavior conceptualizations and the empirical evidence that supports them. Interest in humor behavior has caused several publications in the last decades without a consensus in defining the conditions under which humor occurs and, more importantly, how our own coherence may influence response to a joke. The evidence showed that incongruity is an essential condition for generating the humor responses: However, the focus on the "incongruity," as a central factor to the humor response, and the questionnaires developed to understand the preferences for humor stimulus, did not explain the conditions in which humor behavior occurs, necessarily, at the personal history level. Thus, the present thesis aims to explore some of the conditions that might impact the humor responses.

With this view of the relevant conditions of humor, the conceptual analysis and the scrutiny of empirical evidence have led us to conclude: (a) Humor response is a complex phenomenon because it seems to involve different relations between different networks according to the personal history of relating; and (b) the need for precise analysis that might

include deictic framing as a condition under which humor emergence occurs and those that prevent it.

 In order to know which are the conditions that give rise to the emergence of humor, the current doctoral thesis analyzes the conditions through several protocol to explore whether or not, the funny functions of a "joke" is present. The "joke", as presented in this dissertation, is under relation to humor response.

A first study aims to analyze the impact of three different aspects that might prevent the humor function of the joke. On the one hand, the protocol named as Reality. The main characteristic of this protocol is inviting the participant to listen what will be presented as if being in the situation described in such a situation. On the other hand, the protocol named as Identification. The main characteristic of this protocol is inviting the participant to take the perspective of the characters in the situation being described. Finally, one more protocol, named as Discomfort has as main characteristic inviting to the participant to realize he discomfort of the characters in the situation described. Their effects on humor were measured using facial responses as the primary indicator and self-reports as a secondary measure.

A second study follows the previous one and pretends to extend the findings of the first study, mainly targeting the description of all the relational components that might affect the participants' interaction with the jokes. To achieve these goals, two experiments were conducted in which five protocols were developed to alter humor responses. The first protocol is focused in inviting the participant to take the perspective of the joke characters that feel discomfort in the situation (named as Mix protocol). The second protocol is focused in inviting the participant to take the perspective of the characters in the joke (named as Identification protocol). The third protocol is focused in describing a situation in which the joke characters feel discomfort (named as Discomfort protocol). The fourth protocol adding words, letters, and colors to the content of the "joke" as well as altering the timing and order of sentences (named

as Desliteralization protocol). A final protocol is focused in presenting the "jokes" without any

type of alteration. Their effects on humor also were measured using facial responses as the

primary indicator and self-reports as a secondary measure.

CHAPTER 2: EXPERIMENT 1 – ALTERING THE HUMOR DERIVATION

1.1. Prelude

This chapter presents the published paper "Is this a Joke? Altering the Derivation of Humor Behavior" (Bebber, Luciano, Ruiz-Sánchez, & Cabello in International Journal of Psychology & Psychological Therapy, 21, 3, 413-431, 2021). This study aimed to explore the conditions that might alter the individuals' response to a joke (i.e., smiling at a joke or not). As discussed in the previous chapter, people can respond to a joke in several ways. For this reason, we first selected several jokes and conducted a survey with 107 undergraduate students of Almería to determine whether the jokes selected were identified as jokes and considered funny to this population. Once determined that the jokes were jokes and funny, we designed three experimental protocols and applied them to the jokes in the laboratory context, as follows it is presented[2] (for details of the survey, see Appedinx).

2.2. Introduction

Let us imagine Paul is in a bar with some friends when one of them says, "In the surgery room, a surgeon says to a patient: Relax David, it is just a small surgery. Don't panic. Surprised, the patient says that his name is not David and the surgeon quietly responds: I know. I am David." Paul smiles.

Most verbally sophisticated individuals will also respond to this story with a humorous response: smiling or laughing as a function of his/her personal history. Humor response has been demonstrated to be a language-based skill experienced across cultures (Apte, 1985; Lefcourt, 2001), with a vast number of studies on humor been published in mainstream Psychology. These studies are mainly focused on the correlations between self-reports about the presence of humor and its psychological or physiological benefits, such as improving emotion regulation and reducing blood pressure (e.g., Lefcourt, Davidson, Prkachin, & Mills,

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[2] The publication was adapted to the format of the thesis.

1997, Samson & Gross, 2012). However, the correlational evidence has not served to achieve a consensus about the definition of humor and, mainly, about what might be the conditions under which humor responses develop (Martin & Ford, 2018; Morreall, 2009). A common issue among humor theories is the emphasis on "incongruity" as the central factor (Martin & Ford, 2018; McGhee, 1979; Morreall, 1983; Raskin, 1985; Ritchie, 2018), which is mainly described as conflicting expectations coming along when hearing or reading the contents of a joke, with one situation violating the expectation of another situation (Ritchie, 2004; McGraw & Warren, 2010). That is, the joke mentioned above was funny to Paul because, according to his history, he should not be expecting a surgeon saying "Relax, don't panic", and doing it in the presence of the patient who is going to receive the surgery from him.

Incongruity has also been taken into account when approaching humor behavior from a functional perspective on behavior. For instance, Skinner (1957) addressed humor as verbal behavior, giving several reasons why people laugh and indicating that "some behavior may be laughable merely because it is clumsy, awkward, surprising, or otherwise amusing in character..." (p. 285). Similarly, the account of language proposed by Relational Frame Theory (Hayes, Barnes-Holmes, & Roche, 2001) defined that "most jokes create relational networks that are complete, meaningful, and coherent but incongruous" (Stewart, Barnes-Holmes, Hayes, & Lipkens, 2001, p. 83). Two studies have been published in this context, one that taught double meaning comprehension to young children (Jackson, Núñez, Maraach, Wilhite, & Moschella, 2021), and the other that taught children with autism to detect and respond to sarcasm (Persicke, Tarbo, Ranick, & Clair, 2013). However, experimental evidence is needed to further identify the conditions under which humor emerges.

In moving forward the research in this area, the problems regarding the type of measure used to identify humor response are well noticed. Typically, the research conducted has used self-report measures (e.g., using a Likert scale for participants to write how funny was a specific

joke or how they felt after listening to a joke). The practice of self-reports has been found troublesome in different areas as it relies on the assumption that there is a correspondence between what the participant reports and what he/she does, but these two behaviors do not necessarily go together (e.g., Critchfield, Tucker, & Vuchinich, 1998; Perone, 1988; Shimoff, 1986; see for a review, Cabello & O'Hora, 2002). In the case of humor, the actual behavior of laughing or smiling at the moment a joke is presented might, or not, be equivalent to reporting the impact of a joke in a subsequent moment. Accordingly, when the joke is presented, selecting facial responses as the main measure seems to be more adequate than reporting the identification of humor responses even when both measures might agree as parts of the same class.

As already mentioned, there is extensive literature correlating humor with different psychological and physiological variables, but little is known about the conditions under which humor emerges. Then, the question of why one person laughs at a joke remains unanswered. This study aims to move forward in this direction to explore the impact of three experimental protocols to alter the humor response. First, by inviting the participant as if being in the situation described in the joke (the reality protocol); second, by inviting the participant to take the perspective of the characters in the joke (the identification protocol); and lastly, describing the discomfort in the characters of the joke (the discomfort protocol). Facial responses are measured as the primary indicator to identify humor responses, while self-reports are used as a secondary measure.

2.3. Method

2.3.2. Participants, Settings and Apparatus

Twenty-three Spanish-speaking undergraduate students participated (14 female; age range 21-33) in exchange for course credits. Participants were randomly assigned to one of two

conditions described in the procedure, the first one with 11 participants (8 female; *Mean age=* 23.8) and the second one with 12 participants (7 female; *Mean age=* 23.3).

The experiment was conducted individually in a laboratory room equipped with a table, two chairs, a Samsung computer with headphones, and a webcam device that recorded participant's facial reactions. The software for presenting stimuli and collecting responses was written in Visual Basics for Applications 2013 and is available upon request from the first author.

2.3.2. Instruments and Measures

Acceptance and Action Questionnaire-II (AAQ-II; Bond, Hayes, Baer, Carpenter, Guenole, Orcutt, Waltz, & Zettle, 2011; Spanish version by Ruiz, Langer, Luciano, Cangas, & Beltrán, 2013). A general measure of experiential avoidance. It consists of 7 items rated on a Likert-type scale, and the Spanish version of the AAQ-II has shown good psychometric properties (mean alpha= .88).

Perspective Taking, scale of the Interpersonal Reactivity Index (IRI, Davis, 1983; Spanish version by Escrivá, Frías, & Samper 2004) is a self-report measure in which the score indicates a subject's attempts to adopt another's perspective in real situations. The scale contains 7 items rated on a Likert scale. The Spanish version of the PT has good psychometric properties with a mean alpha= .56.

Cheerfulness and Seriousness scales of the State Trail Cheerfulness Invesntory (STCI-S; Ruch, Kohler & van Thriel, 1997; Spanish version by López Benítez, Acosta, Lupiáñez, & Carretero-Dios, 2017) also has good psychometric properties (cheerfulness mean alpha= .86, seriousness mean alpha= .86).

Jokes. Four jokes were used during the study. They were considered the funniest from a larger pool of jokes by a sample of 107 undergraduate students during a pilot study. Table 1 shows the jokes in English with explanations to overcome the cultural differences (the original versions in the Spanish language are incorporated in Appendix 1).

In-between jokes activities. Participants performed 36 activities presented between jokes, such as watching videos and images (e.g., a video of a mandala or a weather forecast, taken from YouTube and Google) or responding to the presented situations and tasks (e.g., reporting sensations about something that was displayed, or memorization tasks). A gray screen lasting 3 to 5 seconds separated the activities (Appendix 2 describes the specific type and entire sequence of activities, and Appendices 3 and 4 describe the instructions for the different activities).

Humor facial responses. The presence of smile or laugh is defined, during the presentation of a joke, as an upward curvature of the edges of the lips, with or withouth the display of teeth, with or without a vocal sound (Ekman, Davidson, & Friesen, 1990; Provine, 1996; Ruch & Ekman, 2001). The presence or absence of smile was determined by the agreement between the experimenter and two independent evaluators using the videos recorded during the experiment. Interobserver agreement was calculated using Cohen's kappa (Cohen, 1965).

Self-reports. To collect self-reports, participants responded to one of five options: (1) "Seemed unfair to me"; (2) "Seemed funny to me"; (3) "It worried me"; (4)"It has angered me"; and (5) "Another." The presence of humor was considered when participants selected the second option, and is termed "funny report" in this paper.

Table 1.

Jokes presented during the experiment

Doctor	Doctor: "Relax David! It's just a little surgery. Don't panic." Patient: "My name is not David." Doctor: "I know. I am David."
Beer	"Listen Juan, I wasn't going to drink a beer but then my cat came and said *MAHOU** and I told the cat… let's have one!."
Job	Job interviewer: "English knowledge?." Candidate: "High." Job interviewer: "Translate juguete". Candidate: "*Toy*.**" Job interviewer: "Use it in a sentence." Candidate: "Toy sad." Job interviewer: "Hired!."
Soccer	Two football players in a very rough match Player 1 said to Player 2: Player 1: "Keep doing me that and I am going to break the bone in your leg." Player 2: "It is said… tibia." Player 1: "OK, As I said, *TIBIÁ* break the leg."

Note: Job, and Soccer jokes have a double meaning of cultural character and were translated from Spanish to English.**Mahou* is a popular beer in Spain, but this joke is used for the cat's meow.***Toy* in Spanish is a relaxed and colloquial way to pronounce *Estoy*, which means "I am" (present tense verb "to be"). *Toy* is used as a present-tense version of a Spanish sentence, not an English one in this joke. ****TIBIÁ* in Spanish means the same as in English and its phonetics sounds similar to a relaxed and colloquial way of pronouncing *te voy a*, which means "I am going to". In this joke, *TIBIÁ* has a double meaning for breaking the bone and that verb.

2.3.3. Design

An experimental design with two conditions was implemented, as described in Figure 1. In the Control (not-manipulated) condition, participants were presented with the four jokes without any kind of manipulation in the first phase. Then, in the second phase, participants were presented with the same four jokes. Jokes were separated by the presentation of in-between activities in all cases.

The second condition included both manipulated and non-manipulated jokes. That is, in the Experimental condition, participants were presented, in the first phase, with the manipulation (an experimental protocol) applied to, respectively, the first three jokes (the Doctor, Beer, and Job jokes respectively), and then with a non-manipulated joke (the Soccer joke). Then, in the second phase, all the four jokes were presented without any kind of manipulation, that is, as in the Control condition.

In other words, both conditions differed in the first phase of the experiment, in which the Control condition becomes a control for the effect of the protocols used in the Experimental condition. During the second phase of the experiment, the jokes presented did not involve any manipulation because the aim was to explore the effects of presenting the jokes for a second time.

2.3.4. Procedure

Upon arrival at the laboratory, participants sat individually in a chair in front of the computer, signed an informed consent form, and filled out the pre-experimental measures (e.g., the AAQ-II, IRI, and STCI-S questionnaires). Then, the experimenter (who was the same for

all participants) briefly explained that the purpose of the study was to determine how people responded to different contexts and tasks. He also indicated that all instructions would appear on the computer screen. Then, he asked the participants to use headphones and instructed them to press a button on the keyboard to begin the experiment. The experimenter then left the room. All procedures were approved by the Ethics Committee for Research with Human Participants of the University of Almería. The following instructions appeared on the computer screen for all participants:

"*Our responses change depending on the circumstances. Sometimes we watch a movie and get excited, while sometimes we do not. Sometimes we see something and have feelings of pleasing or fun, while other times we feel boredom, annoyance, pain, or discomfort. In this study, we try to investigate how we respond to different situations. There are no right or wrong answers. Whatever you might respond, will be fine. We kindly request you to pay attention and answer honestly.*"

As indicated (see Figure 1), the experiment's first phase was different for each condition. In the Control condition, four jokes were presented, starting with the Doctor joke, followed by the Beer joke, the Job joke, and ending with the Soccer joke. In the Experimental condition, the same four jokes were also presented, but the first three were preceded by the respective experimental protocol (that is, the reality, Identification, and Discomfort protocols). The experimental protocols were:

Reality protocol (lasting 50 seconds): "*Please imagine that you are in a hospital... that what you are listening to is real as if it were happening at this moment,*" *(the screen turned dark gray, and the rest of the protocol was presented through the headphones). "Now try to imagine as much as you can, that you are close to the surgery room, that you are observing what is happening. Imagine that you are seeing people entering and leaving that place, the*

doctors, the nurses... and then, you see the patient... he is lying on the surgery table (a heartbeat starts and still until the joke ended). At this moment you can see the surgeon approaching the patient."

[Then, the Doctor joke was presented.]

Identification protocol (lasting 29 seconds): "*You are going to read something about someone named Juan. We ask you to try to imagine that you are him. Now, imagine that you, as if you were Juan, have been trying to help a friend to stop drinking for a long time. Imagine that you are worried about him, and you ask how he is doing.*" Then the following sentence was added: "*Remember trying to be Juan and the efforts you are making to help your friend stop drinking.*" Then, the next sentence followed: "*Juan: Hey, how are you doing? Friend's answer.*"

[The Beer joke was then presented.]

Discomfort protocol (lasting 19 seconds): all the sentences in this protocol appeared simultaneously on the screen: "*Now you are going to watch a job interview. These are interviewers who laugh at people and set up false interviews to laugh at candidates. They enjoy giving them a hard time, inviting unqualified people with financial troubles to ridicule them, and they tell they got the job when it is all a lie.*"

[Then, the Job interview joke followed]

After the three manipulated jokes were presented, the fourth joke (the Soccer joke) was presented without manipulation. Then, all participants were invited to a 10-minute break, after which they went through the second phase of the experiment. In both conditions, this phase consisted of presenting the four jokes without manipulation and in the same order as in the first

part (i.e., Doctor, Beer, Job interview, and Soccer). As shown in Figure 1, all participants received the same sequence of jokes although in the Control condition the jokes were presented without manipulation while in the Experimental condition the Doctor, Beer and Job jokes were presented without the experimental protocols for the first time in the second phase. Finally, when the four jokes had been presented, the computer screen displayed a message indicating that the experiment was over and participants were debriefed.

Figure 1. Experimental design. Jokes are presented at the bottom and were the same for both conditions. NO MANIP indicates that the joke was presented without any manipulation. REALITY, IDENTIFICATION, and DISCOMFORT indicate the presence of the corresponding experimental protocol before the joke.

2.3.5. Data Analysis

Quantitative variables were described by mean and standard deviation and categorical variables by absolute and relative frequencies. The normality test applied was the Shapiro-Wilk test, and all variables showed normal distribution.

To compare mean age and the scores of experimental avoidance, perspective taking, and cheerfulness and seriousness across conditions, the *t*-student test for independent samples was applied. For comparing facial responses and self-reports between the Experimental and

Control condition, Fisher's exact test were used because more than 25% of the cells had an expected frequency of less than 5, and thus Pearson's chi-square test could not be calculated.

The agreement between observers to determine whether participants were smiling or not was calculated using the kappa coefficient. This coefficient is a value between 0 and 1 and the higher the value, the greater the strength of the agreement. The kappa values between 0.8 and 1.0, represent a very good agreement between observers, and the kappa values between 0.4 and 0.6 represent a moderate agreement. The significance level adopted was $p < .05$ and the analyses were performed in SPSS 21.0.

2.4. Results

In this section, we will firstly present the data from the pre-experimental measures and the inter-observer agreement for the presence of smile during the experiment. Then, we present the data for smiling and self-report responses across jokes, and finally, the agreement between facial responses and self-reports, per participants and across the different jokes.

Table 2 shows the mean score for each condition in the questionnaires that participants completed before the experimental sequence (individual data are available upon request to the first author). Independent sample t-tests showed no statistically significant differences between conditions in any of the measures: the AAQ-II, with $t(21) = 1.774$; the PT scale of the IRI, with $t(21) = -.175$; the CH scale of the STCI-S, with $t(21) = -.566$, and the SE scale of the STCI-S, with $t(21) = -.374$. These results indicate that both conditions were homogeneous regarding to these measures.

Table 2.

Comparison between conditions in pre-experimental measures

	Jokes condition		Modified jokes condition	
	Mean	SD	Mean	SD
AAQ-II	28.6	11.7	21.2	8.4
IRI (PT scale)	27.1	5.2	27.4	3.6
STCI-S (CH scale)	114.6	18.4	118.8	16.5
STCI-S (SE scale)	83.6	13.2	85.5	11.8

Participants' facial responses were analyzed by the first author (Ob1) and two observers (Ob2 and Ob3), and the agreement for the presence of smile was calculated using Cohen's kappa.

The Ob1 trained Ob2 and Ob3 to identify smile responses in the videorecorded faces. After training with ten different facial expressions, the trained observers performed a test identifying the presence or absence of smiles in 20 images, both achieving a score of 95%. Then, all observers watched the participants' videotaped faces throughout the experiment. The three observers were blinded to the moment the joke was happening. The total number of faces evaluated was 175, corresponding to four for each of the 23 participants in the first phase and four for the 20 participants in the second phase (two participants quit after the first phase and another participant was not properly recorded due to an error in the computer program). The observers evaluated the face responses in a separate room over seven days (the specific data regarding interobserver agreement is available upon request of the first author).

Table 3 indicates the kappa coefficient for each pair of observers and for each of the four jokes. Kappa values ranged from 0.85 to 1, indicating almost perfect agreement (Landis & Koch, 1977). Therefore, these results assure that the facial expressions were adequately measured.

Table 3.

Kappa values for interobserver agreement per each joke across two faces

Joke	Ob1 vs. Ob2	Ob1 vs. Ob3	Ob2 vs. Ob3
Doctor	.93	.93	1.0
Beer	1.0	.95	.95
Job	1.0	.88	.88
Soccer	.90	.85	.95

Figure 2 shows the percentage of participants who smiled during the presentation of the jokes in the upper graph, whereas the lower graph indicates the percentage of participants who reported the jokes as funny. In both graphs, the four jokes on the left correspond to the first phase, and the four jokes on the right to the second phase.

Regarding the facial response measure, the smiling faces in the first phase show the following data (see Figure 2 left part of the upper graph): when the Doctor joke was presented to the 11 participants in the Control condition, and to the 12 participants in the Experimental condition 8 (73%) and 1 (8%) participants smiled, respectively, (significant difference, $p=$ .003). In the Beer joke, nine participants (82%) in the Control condition smiled, while when the Beer joke was manipulated with the identification protocol, six participants (50%) did, with no significant difference. Regarding the Job joke, all the participants in the Control condition smiled, while only two participants (17%) did when the discomfort protocol was implemented ($p < .001$). Lastly, when the Soccer joke was presented in both conditions without any manipulation, ten (91%) and eight (67%) participants, respectively, in both conditions smiled (no significance was obtained).

As for the self-report measure during the first phase (see Figure 2 right part of the lower graph), data were as follows. In regard to the Doctor joke, nine participants (82%) reported the joke as funny in the Control condition, while two participants (17%) reported in the same

direction when the joke was manipulated with reality protocol (the difference was significant, $p= .003$). Regarding the Beer joke, nine participants (82%) responded to the joke as funny. In contrast, when the Beer joke was manipulated with the identification protocol, seven participants (59%) responded that the joke was funny (no significant difference was found). In the Job joke, eight participants (73%) reported that the joke was funny in the Control condition. In contrast, one participant (8%) smiled when the discomfort protocol was implemented to the Job joke in the Experimental condition ($p= .003$). When no protocols were applied in the Soccer joke with no manipulation in both conditions, ten (91%) and seven (58%) participants reported that the joke was funny (no significant difference was found).

These results indicate that there was a consistent pattern in the first phase when participants were exposed to the three distinct experimental protocols, that is, they showed a much lower percentage of smiling and of reporting the jokes as funny as compared to participants who were exposed to the unmodified jokes. The absence of smiling and funny reporting was particularly large when the reality and discomfort protocols were presented and, to a lesser degree, when the identification protocol was implemented.

During the second phase, the four jokes were repeated for the Control condition while, for the Experimental condition, the three first jokes were presented for the first time unmanipulated while the fourth joke was presented again without manipulation. The data obtained (see Figure 2, right upper part) show that when participants were exposed to the Doctor joke, five of them (50%) smiled in the Control condition, while only two did (18%) in the Experimental condition (no significant difference was found). In the Beer joke, seven participants (70%) and five (45%) smiled (no significance difference between conditions was found). When the Job joke was presented, six participants (60%) smiled in the Control condition but only two of ten did (20%) when the joke was not manipulated (no significance

difference between conditions was found). Lastly, when the Soccer joke was presented, six participants (60%) in the Control condition smiled while only one participant did (9%) in the Experimental condition (p= .024).
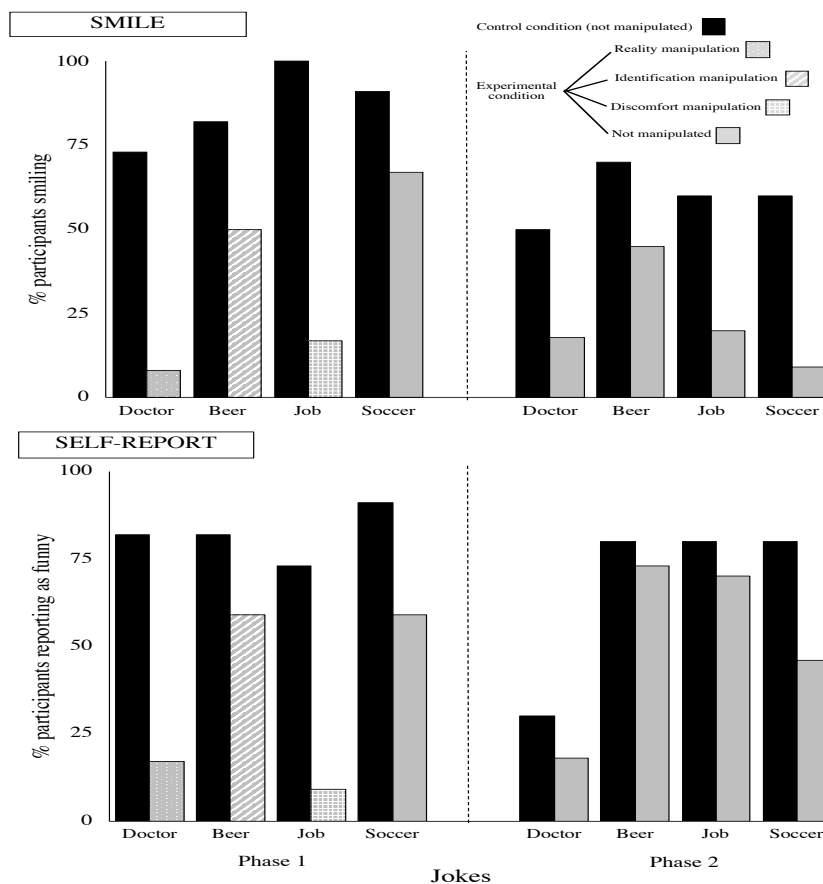
Figure 2. The upper and the lower histograms show the percentage of smiling and reporting funny responses per joke. Black bars represent the Control condition (not manipulated jokes), and gray bars represent the Experimental condition (three manipulated jokes represented with horizontal lines, diagonals, and points and one not-manipulated joke represented with plain gray).

Data were as follows regarding the self-report in the second phase (see Figure 2, right part of the lower figure). When the Doctor joke was presented, three participants (30%) and two (18%) responded that the joke was funny in the Control and Experimental condition,

respectively (no significant difference was found). In the Beer Joke, eight participants (80%) reported that the joke was funny in the Control condition, while also eight participants (73%) reported in the same direction (the difference was not significant). When participants were asked about what they just saw in the Job joke, eight participants (80%) in the Control condition reported it to be funny, while seven of ten did (70%) in the Experimental condition (no differences were found). Finally, in the Soccer Joke, eight participants (80%) and five (45%) responded that the joke was funny in the Control and Experimental condition, respectively (no significant differences between conditions was found).

To sum up, the data obtained in the second phase reveal that both conditions show a reduction in smiling, either when they were re-exposed to the jokes as in the Control condition, or when they received the jokes for the first time without being preceded by the experimental protocols as in three first jokes in the Experimental condition. In contrast, the data of the funny report in the jokes of the Control condition was almost the same for all jokes (except the Doctor joke), while the funny report of the Experimental condition increased in the Beer and Job jokes, decreased in the Doctor joke, and slightly decreased in the Soccer joke. These changes in the funny report show a similar percentage of participants reporting the joke as funny in both conditions during the second phase.

Table 4 shows each participant's responses for all jokes, indicating an agreement or not between the facial and self-reports. The left panel demonstrates whether the participants smiled or not and whether or not they reported the joke as funny in each phase (indicated with a Y or N for both measures). Second, it shows data regarding the number of agreements between facial response and self-reports for the four jokes of each phase, including either smiling and reporting the joke as funny (named Y/Y agreement) or not smiling and reporting other sensation (named N/N agreement).

Data show a high number of agreements in the first phase. Each participant presented an amount of total agreement (i.e., Y/Y plus N/N) in three or four of the jokes, except for P1, P4, P21, and P22, who showed agreement in two of the jokes, and for P12, who showed no agreement. In the second phase, the pattern of agreement responses differs across conditions. The participants in the Control condition showed a similar number of agreements (except for P3 and P9 with none and one responses agreement, respectively). In contrast, the participants in the Experimental condition showed higher variability, with 5 of 11 participants showing agreement in the four jokes, whereas the other 6 showed agreement just in one or two jokes.

Following Table 4, the number of participants showing some type of agreement (either Y/Y and N/N agreements) is reported at the bottom of each condition, and the percentage that those participants represent from the total in the condition. With these data Figure 3 illustrates the percentage of total agreement (including Y/Y and N/N agreement), and the percentage of Y/Y agreement are presented for both conditions.

The Control condition (upper graph) shows a high percentage of agreement in both total and Y/Y agreement (between 75% and 100%) in both phases. However, the total agreement decreased in the first two jokes when participants responded by the second time (from 91% to 60% in the Doctor joke and from 82% to 70% in the Beer joke). In regard the Experimental condition (lower graph), the total agreement percentage is lower than those in the Control condition (upper graph) in both phases. Comparing first and second phases in the Experimental condition, data show a similar tendency, between 75% and 60%, except for the Job joke in the second phase where total disagreements were almost 50%.

Table 4. *Facial responses and self-reports across all participants, jokes and conditions*

Condition	Partic	Phase 1					Phase 2				
		Doctor S/FR	Beer S/FR	Job S/FR	Soccer S/FR	# Agreements	Doctor S/FR	Beer S/FR	Job S/FR	Soccer S/FR	# Agreements
Control Condition N=11	P1	N/Y	N/Y	**Y/Y**	**Y/Y**	2/4	N/N	**Y/Y**	**Y/Y**	N/Y	3/4
	P2	**Y/Y**	**Y/Y**	**Y/Y**	**Y/Y**	4/4	**Y/Y**	**Y/Y**	**Y/Y**	**Y/Y**	4/4
	P3	N/N	**Y/Y**	**Y/Y**	**Y/Y**	4/4	Y/N	N/Y	N/Y	N/Y	0/4
	P4	**Y/Y**	Y/N	Y/N	**Y/Y**	2/4	Y/N	**Y/Y**	**Y/Y**	**Y/Y**	3/4
	P5	**Y/Y**	**Y/Y**	**Y/Y**	**Y/Y**	4/4	**Y/Y**	**Y/Y**	**Y/Y**	**Y/Y**	4/4
	P6	**Y/Y**	**Y/Y**	**Y/Y**	**Y/Y**	4/4	-	-	-	-	-
	P7	**Y/Y**	**Y/Y**	**Y/Y**	**Y/Y**	4/4	N/Y	**Y/Y**	**Y/Y**	**Y/Y**	3/4
	P8	**Y/Y**	**Y/Y**	Y/N	**Y/Y**	3/4	N/N	N/N	N/N	N/N	4/4
	P9	**Y/Y**	N/N	**Y/Y**	**Y/Y**	4/4	Y/N	N/Y	N/Y	N/N	1/4
	P10	**Y/Y**	**Y/Y**	**Y/Y**	N/N	4/4	N/N	Y/N	N/N	**Y/Y**	3/4
	P11	N/N	**Y/Y**	Y/N	**Y/Y**	3/4	N/N	**Y/Y**	**Y/Y**	**Y/Y**	4/4
Total		8/9	9/9	11/8	10/10	38/44	5/3	7/8	6/8	6/8	29/40
% Total		73%/82%	82%/82%	100%/73%	91%/91%	86%	50%/30%	70%/80%	60%/80%	60%/80%	72%
Y/Y Agreement (%)		8 (73%)	8 (73%)	8 (73%)	10 (91%)		2 (20%)	6 (60%)	6 (60%)	6 (60%)	
N/N Agreement (%)		2 (18%)	1 (9%)	0 (-)	1 (9%)		4 (40%)	1 (10%)	2 (20%)	2 (20%)	
Total Agreement (%)		10 (91%)	9 (82%)	8 (73%)	11 (100%)		6 (60%)	7 (70%)	8 (80%)	8 (80%)	
Experimental Condition N=12	P12	N/Y	N/Y	N/Y	N/Y	0/4	N/Y	N/N	N/Y	N/Y	1/4
	P13	N/N	N/N	N/N	Y/N	3/4	N/N	**Y/Y**	**Y/Y**	N/N	4/4
	P14	N/N	**Y/Y**	N/N	Y/N	3/4	N/N	**Y/Y**	N/N	N/N	4/4
	P15	N/N	N/Y	N/N	Y/Y	3/4	-	-	-	-	-
	P16	N/N	**Y/Y**	Y/N	N/N	3/4	Y/N	N/Y	-	N/N	1/3
	P17	N/N	N/N	N/N	Y/Y	4/4	N/N	**Y/Y**	N/Y	N/Y	2/4
	P18	N/N	N/Y	N/N	Y/Y	3/4	N/N	**Y/Y**	N/Y	N/Y	2/4
	P19	N/Y	**Y/Y**	N/N	Y/Y	3/4	N/N	N/N	N/N	N/N	4/4
	P20	N/N	N/N	N/N	Y/Y	4/4	N/N	N/Y	N/Y	N/Y	1/4
	P21	Y/N	Y/N	Y/N	Y/Y	2/4	**Y/Y**	**Y/Y**	**Y/Y**	**Y/Y**	4/4
	P22	N/N	Y/N	Y/N	N/N	2/4	N/N	N/N	N/N	N/N	4/4
	P23	N/N	**Y/Y**	N/N	N/N	4/4	N/N	N/Y	N/Y	N/N	2/4
Total		1/2	6/7	2/1	8/7	34/48	2/2	5/8	2/7	1/5	29/39
% Total		9%/17%	50%/58%	17%/9%	67%/58%	70%	18%/18%	45%/73%	20%/70%	9%/45%	74%
Y/Y Agreement (%)		0 (-)	4 (33%)	0 (-)	6 (50%)		1 (9%)	5 (45%)	2 (20%)	1 (9%)	
N/N Agreement (%)		9 (75%)	3 (25%)	9 (75%)	3 (25%)		8 (73%)	3 (28%)	3 (30%)	6 (55%)	
Total Agreement (%)		9 (75%)	7 (58%)	9 (75%)	9 (75%)		9 (82%)	8 (73%)	5 (50%)	7 (64%)	

In the Experimental condition, the gray-background Phase 1 columns are labelled: Doctor = Reality manipulation; Beer = Identification manipulation; Job = Discomfort manipulation.

Partic = participants; S = smile; FR= funny report; Y= yes; N= no; gray background indicates manipulated jokes.

Looking at the Y/Y agreement, data from both conditions show a different pattern which point to the impact of responding in different conditions. In phase one, Y/Y agreement is higher when the jokes were presented without manipulations than when they were presented after the experimental protocols (the first three jokes in the Experimental condition). Further, the last joke without manipulation (the Soccer joke) also presented a higher Y/Y agreement in the Control condition. In phase two, data show a similar pattern of agreement, except for the a decreased percentage of agreement in the Doctor joke for the Control condition, and in the Soccer joke of the Experimental condition.
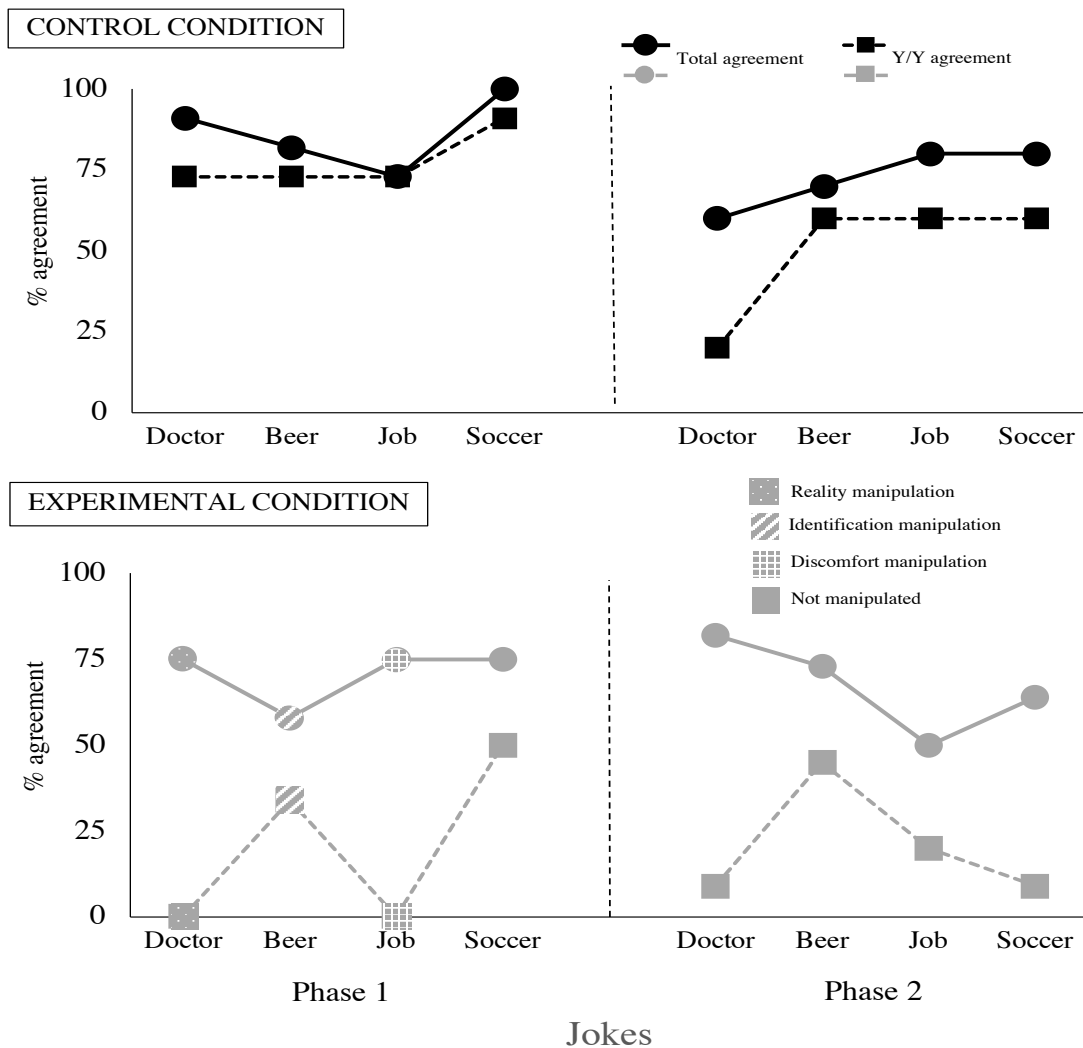
Figure 3. The upper and lower graphs show the agreement of smile and funny report (Y/Y) plus the opposite (N/N) (shown in circles) and only Y/Y (shown in squares) for both conditions. The Control condition condition (upper graph) with black circles and black squares, and the Experimental condition (lower graph) with gray circles and gray squares.

2.5. Discussion

This study is the first behavioral-analytic attempt to analyze the conditions under which humor emerges. Specifically, this experiment aims to explore different contextual ways to alter the derivation of humor. To this end, four jokes were used and three experimental protocols were designed to alter the context of the jokes. The four jokes were selected on the basis of

having been chosen as funny jokes by the university population in Spain. The rationale of the designed experimental protocol was that if any of them produced differences in the effects of a joke, that should mean that the conditions included in the specific protocol might be relevant for altering the derivation of humor responses. Four jokes were presented with no manipulation to the participants in the Control condition. In the Experimental condition, the first three jokes were presented preceded by one of the three experimental protocols. The fourth joke was presented without any contextual manipulation. Then, all participants were exposed to a second phase in which the four jokes were presented with no manipulation.

The results obtained might be summarized as follows. Firstly, when participants were presented with the jokes for the very first time, those in the Control condition smiled and reported the joke as funny. This result occurs in all the jokes, which replicates previous studies where these jokes were evaluated as funny jokes in this type of university population. In contrast, the findings from the Experimental condition showed that the experimental protocols effectively produced consistent, replicable changes in how participants responded to the jokes. Specifically, participants did not smile and did not report the joke as funny when the Reality and Discomfort protocols were implemented, while a variable effect was obtained when the Identification protocol was in place.

Secondly, when the jokes were presented for the second time, participants in both conditions reduced smiling responses, with no significant differences between the conditions (except for the Soccer joke). These findings might indicate that being re-exposed to the jokes (even being the first time without any manipulation, as in the experimental condition) impacted laughing. These results might be analyzed considering the relatively short interval between the two exposures to the joke. Longer intervals might result in no reduction of the humor responses.

Thirdly, the facial responses (smiling or not) and the self-reports (considering the joke as funny or reporting other sensation) mainly ran parallel to each other in the first phase, with a high level of agreement in both conditions (a little higher in the Control condition). Only the Beer joke with the Identification protocol showed variability between the two measures. Furthermore, the agreement between them decreased slightly when the jokes were presented for the second time in both conditions. That is, the synchronicity of the two responses seemed to have been altered when the jokes were presented for the second time in either of the conditions.

The analysis of the conditions under which the experimental protocols might have produced the lack of smiling and funny reports requires recognizing that no precise experimental comparison between the three protocols can be made in the current experiment. This is so because the three protocols result from the interaction of the person's history of the participant with one specific experimental protocol applied to one specific joke: that is, the Reality protocol with the Doctor joke, the Discomfort protocol with the Job joke, and the Identification protocol with the Beer joke. That said, we will focus on the impact of each protocol in comparison with the impact of the joke with no protocol (a comparison between conditions). As well, we will focus on the comparisons of responding in the same experimental participants when each of them responded to the jokes for a second time (first manipulated and later on with no contextual manipulation).

Both the Reality protocol-Doctor joke and the Discomfort protocol-Job joke radically altered the derivation of smiles and funny reports in almost all the participants, while the Identification protocol-Beer joke did so in a lower number of participants. Although no comparison between them is intended, we will conceptualize these data according to the characteristics of the specific joke in the context of the specific experimental protocol applied.

On one hand, the Reality protocol was built with cues to establish a different participant's perspective with the elements of the joke. In the Reality protocol, the participant was asked to imagine that the things being told were really occurring, that is, the protocol establishes framing the events THERE in the context of I (the participant)-Now-There. Perhaps, moving the participant to that perspective relation might contextualize the socially established function of a surgeon's role and the interactions in the surgery room, so that the participant should derive an aversive function instead of deriving a discriminative function for smiling. On the other hand, the Discomfort protocol applied to the Job interview joke was focused on coordinating the characters' behaviors with aversive functions, so that the socially established functions linked to doing a job interview might augment or dominate and, consequently, might prevent the incongruity of the participants relating the components of the joke and, consequently, the prevention of the derived smiling response. That is, at the very end –and as could not be in any other way- the protocol interacts with the specific ideographic relational history and might have also derived in the participants changing his/her perspective from YOU-There to I-There-Now so that the functions given to the characters in the interview be transferred to him/herself.

These conceptualizations are only tentative at the conceptual and experimental levels. As said, there is no option in the current study to move further in its analysis. Future experiments might isolate the impact of these changes in perspective or deictic framing based on relational responding to give an account of the conditions under which the coherent, but incongruous, networks are derived (Stewart *et alia*, 2001). Finally, the Identification protocol was implemented as the context for the Beer joke and only prevented smiling in some participants. Contrary, most of them smiled and reported the joke as funny. As previously indicated, to provide a precise account of these differential responses among participants should require further experimental analysis that isolates the interactions between the contextual changes and the participants' way of relating things in the world, including perhaps

the participant's flexibility for changing perspectives. In the Identification protocol, the participants were asked to explicitly imagine to be one of the characters, and the joke was presented in a format that might have precluded the intended aim of the protocol. Perhaps, the participant's perspective-taking history might not be fluent enough or, perhaps, the functions given to not following compromises in the context of friendship as well as the participant's functions with cats and drinking beer. In addition to the latter options, the most parsimonious variable for the variability shown in responding to the Beer joke, in the context of the Identification protocol, might be associated with the functions likely actualized by the specific format selected for presenting the Beer joke (e.g., the word *Mahou* was written in a fond letter different to the rest of the words, and all the dialogue was presented in speech bubbles). Consequently, further analyses should advance in identifying the conditions under which the functions generating the incongruity of the components, as networks, are in place to account for smiling or not smiling.

The results obtained in this experiment need to be replicated through different conditions, and caution is emphasized to not generalize these results to conditions other than those that define the current experiment, including the type of history that participants might have and that form part of the whole event of responding to the jokes as in any other event (Luciano, Törneke, & Ruiz, in press). That is, young or adult persons might have a different relational history in regard to the functional components of the jokes and perhaps to the flexibility to change from one perspective to another. For the same reason, people with different repertoires about the cultural meaning of the content of these jokes might respond differently. To sum up, different patterns of results might be obtained when the whole context of the experiment is considered.

Lights and darks emerge in this study as in any scientific step. In regard to the former, humor responses were registered through two measures, the participant's smiles when they read the jokes and, some seconds later, the self-report about the feeling in the previous experience. As indicated in the introduction, most of the studies relied on self-reports while measuring the changes in facial expression is advocated to avoid the limitations associated with the use of self-reports (Cabello & O'Hora, 2002; Critchfield, Tucker, & Vuchinich, 1998; Perone, 1988; Shimoff, 1986). This study provides a clear agreement of both responses at the individual level, but the absence of coordination between the two responses was also present, perhaps when the context was not clear enough for the participants. The agreement might be analyzed as two behaviors under the same functions or forming part of the same functional class. The lack of coordination might be analyzed in terms of different contextual functions. One way or another, the systematic analysis of agreements is a step forward that strengthens the conditions under which this study is presented, especially because different personal histories might allow for both responses not being "in the same package." Consequently, further studies on humor are encouraged to measure facial expressions.

The dark points or limitations of the study are also worth mentioning. Probably, the most relevant is that each protocol's effect was restricted to a particular context (that is, a particular joke), and that the sequence and timing of the presentations of all the jokes to the same participant might have generated carry-over effects. Also, the fact that although the participants were equivalent in regard to some repertoires as measured by the pre-experimental questionnaires, these measures did not constitute good measures of the self-rules about the components of the jokes and about the flexibility in relating and transforming functions, for example, for one perspective to another in time (now, then), agent (I, You), and place (here, there).

To conclude, this paper constitutes a first exploratory study showing the disruption of humor responses when the Reality and the Discomfort protocols were implemented, and to a lesser degree with the Identification protocol, which in turn might be useful to answer our original question of why a joke produces humor for a person. The study was not designed to compare these three protocols among them but to analyze each of them in the context of a joke with no protocols. Also, the study was not designed to isolate the processes involved in each of these protocols when they alter the functions that typically generate the joke. All in all, conclusions should be considered cautiously, and replications are needed. Further research will focus on clarifying the functional roles of perspective framing as processes involved in changing the functions of the networks of the jokes, either for preventing or for promoting the emergence of humor behavior. That way, the incongruity that has been advocated in the humor literature, might be distilled in the relational processes involved in humor behavior.

CHAPTER 3: ANALYZING THE IMPACT OF PERSPECTIVE-TAKING AND DISCOMFORT FUNCTIONS

The previous chapter showed the relevant role of perspective-taking and discomfort functions in preventing humor response. We manipulated three protocols - Reality, Identification, and Discomfort - to establish functions incompatible with joke functions. As discussed, it appears that all three protocols make discomfort functions present through a process of the I-Here-Now deictic. However, no protocol has made such a process explicit.

For this reason, we extend these findings by exploring and making explicit the role of perspective-taking and discomfort functions in one protocol, as well we separated both functions into two different protocols and analyzed their impact when the joke is presented. We distributed the three protocols in six conditions in an identical experimental design of previous study. That is, in Phase 1, participants were exposed to the jokes with and without protocols (protocols distribution is described below). In Phase 2, participants were re-exposed to all the jokes without protocols. In order to facilitate the lecture, we will first present all the six conditions Phase 1, followed by the same condition but without protocols in Phase 2.

PHASE 1 – JOKES WITH AND WITHOUT PROTOCOLS

3.1. Introduction

The conceptual approach to humor, discussed in chapter 1, is not currently supported by extensive experimental evidence. Studies on humor behavior has shown the successful behavioral interventions to teach humor (Persicke et al., 2013; Jackson et al., 2021), but the conditions under which humor response emerge still unclear. The present study aims to extend the findings of the previous chapter by including explicitly all the relations that might affect the participant's interaction with the jokes (i.e., perspective taking and discomfort functions). RFT has accounted for perspective taking (PT) as deictic relational frames - interpersonal (*I* versus *You*), spatial (*Here* versus *There*), and temporal (*Now* versus *Then*). Recent research on deictic framing showed that when introduced perspective of others impacts on own perspective

(e.g., McHugh, Barnes-Holmes, & Barnes-Holmes, 2004; Villate et al., 2012; Barbero-Rubio, et al., 2016). In addition, the evidence has shown that once a stimulus acquires a function, the function of the stimuli related to it is transformed depending on the type of relation established with them (And & Roche, 2015; Dymond & Barnes, 1995, 1996; Dymond & Fergunson, 2007; Dymond, Roche, Forsyth, Whelan & Rhoden, 2007, 2008; Rodríguez-Valverde, Luciano, & Barnes-Holmes, 2009; Stewart, Hooper, Walsh, O'Keefe, Joyce, & McHugh, 2015; Whelan, Barnes-Holmes & Dymond, 2006).

In the case of deictic frames, if someone is going through a difficult situation and we situate ourselves as if we were them, the functions have been transferred to the I-here-now as if it were the-there-then, being able to feel from our history what the other may be feeling (for a review on PT, see Luciano et al., 2020).

With this in mind, we will focus on the functional role of deictic framing with discomfort functions as psychological processes involved in changing the functions of relational networks involved in-jokes. For this, both elements will be mixed to alter humor responses; that is, framing the all the joke in one protocol that include perspective frames of I-Here-Now with functions of discomfort. Also, we will isolate the impact of either the perspective-taking or discomfort functions in the humor responses to the two jokes. Parallel to this, to avoid the carry-over effects of presenting all the jokes to the same participants, we will include another way to disrupt the relational network involved in the jokes by desliteralizating the functions of some words in the joke (Masuda et al., 2004; Valdivia et al., 2006; Masuda et al., 2008).

To achieve these goals, the current study aimed to extend the previous finding of humor derivation by comparing the effect of four protocols on humor responses. Two experiments with six conditions were conducted to alter the humor responses of the jokes. Experiment 1 included two protocols in one of the two conditions. Specifically, two jokes were preceded by

(1) one protocol that invited the participant to take the perspective of the joke characters that feel discomfort in the situation of two jokes; and one joke (2) included adding words, letters, and colors, as well as altering the timing and order of sentences. The second experiment stems from the first, including the same protocols for different jokes and adding two protocols that consisted of (3) inviting the participant to take the perspective of the characters in two jokes; (4) and describing a situation in two jokes that the joke characters feel discomfort. With that, in experiment 2, two jokes received three different protocols. Their effects on humor were measured using facial responses as the primary indicator and self-reports as a secondary measure.

3.2. Experiment 1

In this experiment, participants were presented with four jokes. For some of the participants, these jokes were preceded by two different protocols: one in which they were invited to take the perspective of the characters involved in the joke and feel discomfort in the situation, and another in which the joke itself was altered by adding words, letters and colors, as well as by altering the timing and the order of the sentences.

3.3. Method

3.3.1. Participants

Twenty undergraduates (13 females; age range = 18-40 years) attending different courses at the Universidad of Almería participated in the experiment. They were recruited through in-class and on-campus flyer announcements, and each of them received 7 euros for participation. All participants read and signed an informed consent about the experiment, then they were randomly assigned to one of the two experimental conditions described in the design.

3.3.2. Setting and Materials

The experiment was conducted individually in a laboratory room equipped with a table, two chairs, a Samsung® computer, and a webcam device that recorded participant's facial reactions. The software for presenting stimuli and collecting responses was written in Visual Basic for Applications 2013 and is available upon request from the first author.

3.3.3. Instruments

*Acceptance and Action Questionnaire-II (*AAQ-II; Bond, Hayes, Baer, Carpenter, Guenole, Orcutt, Waltz, & Zettle, 2011; Spanish version by Ruiz, Langer, Luciano, Cangas, & Beltrán, 2013). It is a general measure of experiential avoidance. It consists of 7 items rated on a Likert-type scale, and the Spanish version of the AAQ-II has shown good psychometric properties (mean alpha= .88).

Perspective Taking (PT), scale of the Interpersonal Reactivity Index (IRI, Davis, 1983; Spanish version by Escrivá, Frías, & Samper 2004). It is a self-report measure in which the score indicates a subject's attempts to adopt another's perspective in real situations. The scale contains 7 items rated on a Likert scale. High scores on this scale indicate high levels of PT. The Spanish version of the PT has good psychometric properties with a mean alpha= .56.

Cheerfulness (CH) and Seriousness (SE) scales of the State Trail Cheerfulness Inventory (STCI-S; Ruch, Kohler & van Thriel, 1997; Spanish version by López Benítez, Acosta, Lupiáñez, & Carretero-Dios, 2017). This scale has also showed good psychometric properties (cheerfulness mean alpha= .86, seriousness mean alpha= .86).

Jokes. The four jokes used in this experiment were the same as those used in Bebber et al. (2021). Table 5 shows the jokes in English with explanations to overcome the cultural differences (the original versions in the Spanish language are incorporated in Appendix A).

In-between jokes activities. Participants performed 44 activities that were presented between the jokes, such as watching videos and images (e.g., a video of a mandala or a weather forecast, taken from YouTube® and Google®) or responding to different situations and tasks (e.g., reporting sensations about something that was displayed, or memorization tasks). They were identical to those in Bebber et al. (2021), except for the inclusion of 8 new activities. A gray screen lasting 3 to 5 seconds separated the activities (Appendix B describes the specific type and entire sequence of activities; Appendix C show the instructions of all activities that was identical to Bebber et al., 2021)

Table 5.

Jokes presented during the experiment

Doctor	Doctor: "Relax David! It's just a little surgery. Don't panic." Patient: "My name is not David." Doctor: "I know. I am David."
Beer	"Listen Juan, I wasn't going to drink a beer but then my cat came and said *MAHOU** and I told the cat… let's have one!."
Job	Job interviewer: "English knowledge?." Candidate: "High." Job interviewer: "Translate juguete". Candidate: "*Toy*.**" Job interviewer: "Use it in a sentence." Candidate: "Toy sad." Job interviewer: "Hired!."
Soccer	Two football players in a very rough match

Marcos said to John:

Marcos: "Keep doing me that and I am going to break the

bone in your leg."

John: "It is said… tibia."

Marcos: "OK, As I said, *TIBIÁ**** break the leg."

Note: Job, and Soccer jokes have a double meaning of cultural character and were translated from Spanish to English. *Mahou is a popular beer in Spain, but this joke is used for the cat's meow. **Toy in Spanish is a relaxed and colloquial way to pronounce *Estoy*, which means "I am" (present tense verb "to be"). *Toy* is used as a present-tense version of a Spanish sentence, not an English one in this joke. ***TIBIÁ in Spanish means the same as in English and its phonetics sounds similar to a relaxed and colloquial way of pronouncing *te voy a*, which means "I am going to". In this joke, *TIBIÁ* has a double meaning for breaking the bone and that verb.

3.3.4.   Measures

Humor facial responses. The presence of smile or laugh was defined as an upward curvature of the edges of the lips, with or without the display of teeth, with or without a vocal sound (Ekman, Davidson, & Friesen, 1990; Provine, 1996; Ruch & Ekman, 2001). The presence or absence of smile was determined at the end of the presentation of a joke and/or three seconds after the end of the joke. An interobserver (IOB) agreement between the experimenter and two independent evaluators using the videos recorded during the experiment. IOB agreement was calculated using Cohen's kappa (Cohen, 1965).

Self-reports. Participants responded to the same self-report used in Bebber et al. (2021), in which five options were presented after each joke (1) "Seemed unfair to me"; (2) "Seemed

funny to me"; (3) "It worried me"; (4) "It has angered me"; and (5) "Another." The presence of humor was considered when participants selected the second option.

3.3.5. Experimental Design

The experimental design included two conditions (*Control* and *Mix Control Desl*, see Figure 4). Each condition consisted of the presentation of four jokes in a fixed order separated by in-between activities. Participants in the *Control* condition were exposed to the jokes without any manipulation, with participants in the *Mix Control Desl* condition exposed to the same jokes in the same order, and to the Mix and Desliteralization protocols (see procedure for a description of the protocols). The Mix protocols preceded the Soccer and Job jokes, and the Desliteralization protocol the Doctor Joke. The Beer joke was not manipulated and thus was presented as in the control condition.
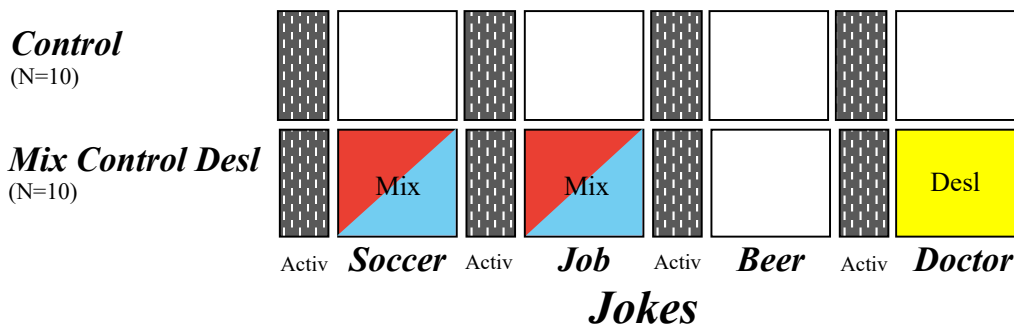
Figure 4. Experimental design. Jokes are indicated at the bottom and were in the same order for both conditions of phase 2. Control and Mix Control Desl refers to the named conditions. The white squares correspond to jokes without protocols. The red and blue and yellow squares refer to Mix and Desliteralization protocols respectively. The grey rectangles with white points indicates the activities in between jokes. Activ = in between activities; D = Desliteralization protocol; and Mix = Mix protocol.

3.3.6. Procedure

The experiment was conducted individually and lasted approximately 40 minutes.

3.3.7. Pre-experimental Measures

Upon arrival at the laboratory, participants signed an informed consent form, completed the pre-experimental measures (e.g., AAQ-II, IRI, and STCI-S questionnaires), and were taken to the experimental room. Then, the experimenter briefly explained that the purpose of the study was to determine how people responded to responded to a number of situations and indicated that instructions would appear on the computer screen. The participant was instructed to press a button on the keyboard to begin the experiment, and the experimenter left the room.

3.3.8. Experimental Procedure and Protocols

As indicated in the design section (Figure 1), the same jokes and in-between activities were used in both *Control* and *Mix Control Desl* conditions, and they only differed in the presentation of the experimental protocols in the latter.

In the *Control* condition, participants were presented firstly with the Soccer joke, followed by the Job joke, and then followed by the Beer and Doctor jokes. All jokes and activities were displayed in the computer screen, with a gray screen separating the presentation of each joke and the presentation of the in-between activities. In the *Mix Control Desl* condition, the Mix protocol was presented before the Soccer and Job protocols. The Beer joke was then presented without any manipulation, and the Desliteralization protocol was presented before the Doctor joke. As in the previous condition, activities were presented in-between jokes. After the fourth joke was presented in each condition, the computer screen indicated that the experiment had concluded and participants were debriefed.

The experimental protocols were presented as follows: Parenthesis indicated the time in which the sentence appeared (participants never saw the time label):

Mix protocol

"Try to imagine for a few minutes that you are José... and that you are playing a soccer match against Marcos... You are rivals... Imagine, that Marcos is being aggressive... he's hitting you over and over again... You, as if you were Jose, feel that he is provoking you, laughing at you... ridiculing you by imitating what you do... Suddenly, he hits you again just when you were about to score a goal......your leg hurts a lot... you see you're bleeding... you face him and you're about to fight him... Then, Marcos approaches you and you say the following..."

[The Soccer joke was presented]

"Now you are going to watch a job interview. These are interviewers who laugh at people and set up false interviews to laugh at candidates. They enjoy giving them a hard time, inviting unqualified people with financial troubles to ridicule them, and they tell they got the job when it is all a lie. We ask you to try to put yourself in the shoes of the person you are about to interview..."

[The Job interview joke followed].

Desliteralization protocol

In this protocol, the Doctor joke was presented on the computer screen with added words, letters and colors, and changes in the order of the sentences (see Figure 5).
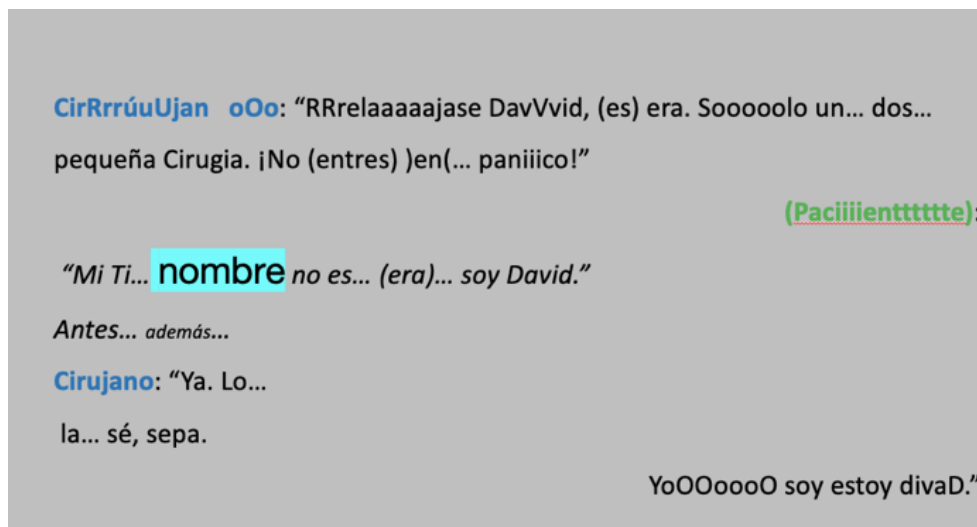
Figure 5. Doctor joke manipulated during the Desliteralization protocol. For a comparison between the manipulated and not manipulated Doctor jokes, see Appendix A

3.3.9. Data Analysis

Quantitative variables were described by mean and standard deviation and categorical variables by absolute and relative frequencies. The Shapiro-Wilk normality test was applied, with all variables showing normal distribution. To compare mean age and the scores of the pre-experimental measures between both conditions, the *t*-student test for independent samples was applied. To compare facial responses and self-reports between both conditions, Fisher's exact test were used because more than 25% of the cells had an expected frequency of less than 5, and thus Pearson's chi-square test could not be calculated. The agreement between observers to determine whether participants were smiling or not was calculated using the kappa coefficient. The significance level adopted was $p < .05$ and the analyses were performed in SPSS 21.0.

3.4. Results and Discussion

This section will first present the data from the pre-experimental measures and the inter-observer agreement for the presence of smiling after each joke. Then, data of facial responses and self-reports is reported per condition, as well as the correspondence between both measures. Results are then discussed according to the components of each protocol.

3.4.1. Pre-Experimental Measures

Table 6 shows the mean score for the pre-experimental measures in each of the two conditions (individual data are available upon request to the first author). Independent sample *t*-tests showed no statically significant differences between participants in the Control 1 and Mix 1 conditions in any of the measures $t(18) = 1.57$ for the AAQ;, $t(18) = -1.645$ for the PT scale of the IRI; $t(18) = -.906$ for the CH scale of the STCI-S, and t $(18)= -2.073$) for the SE scale of the STCI-S). This indicates that both conditions were homogeneous regarding these measures.

Table 6.

Comparison between conditions in pre-experimental measures

Measures	Control 1		Mixed 1		p
	Mean	*SD*	*Mean*	*SD*	
AAQ-II	28.8	7.7	23.3	7.9	.134
IRI (PT scale)	25.6	4.0	28.8	4.1	.109
STCI-S (CH scale)	111.6	13.5	117.6	16	.850
STCI-S (SE scale)	84.3	9.9	96	15.4	.123

3.4.2. Interobservers agreement

The first author (Ob1) and two observers (Ob2 and Ob3) analyzed the participant's facial responses, and the agreement for the presence of a smile was calculated using Cohen's Kappa.

The Ob1 trained Ob2 and Ob3 to identify smile responses in the video-recorded faces (to details of the training, see Bebber et al., 2021). Ob1 was the only one that evaluated all the video-recorded faces. In contrast, Ob2 and Ob3 evaluated 10 and 8 different participants in a separate room over two days, respectively (the specific data regarding interobserver agreement is available upon request of the first author).

Table 7 indicates the kappa coefficient for each pair of observers. Kappa values ranged from 0.85 to 1, which shows an almost perfect agreement (Landis & Joch, 1977). Therefore, these results assure that face responses were adequately measured.

Table 7.

Kappa for interobserver agreement.

	Ob1 x Ob2	Ob1 x Ob3
Kappa values	1,00	0,89

3.4.3. Effects of the Experimental Protocols

Table 8 shows facial-responses, self-reports, and correspondence between them for participants in both conditions, with data from the *Control* condition displayed in the upper panel, and from the *Mix Control Desl* condition in the lower panel. For each joke, it is shown whether the participant smiled or not, and considered the joke as funny or not (indicated with Y or N for both measures). Also, the rightmost column shows data concerning the total number of correspondences between facial responses and self-reports per participant. Participants

smiling and at the same time reporting the joke as funny is named Y/Y correspondence,

whereas not smiling and at the same time reporting other sensation is termed named N/N

correspondence.

Table 8.

Facial responses and self-reports across all participants, jokes, and conditions.

Condition			Control		
	Partic	Soccer S/FR	Job S/FR	Beer S/FR	Doctor S/FR	#Corr
	P1	**Y/Y**	**Y/Y**	**Y/Y**	N/N	4/4
	P2	**Y/Y**	**Y/Y**	**Y/Y**	**Y/Y**	4/4
	P3	Y/N	N/N	**Y/Y**	N/Y	2/4
	P4	**Y/Y**	**Y/Y**	**Y/Y**	Y/N	3/4
	P5	**Y/Y**	N/N	**Y/Y**	N/N	4/4
	P6	**Y/Y**	**Y/Y**	**Y/Y**	Y/N	3/4
	P7	**Y/Y**	Y/N	**Y/Y**	Y/N	2/4
	P8	**Y/Y**	**Y/Y**	N/N	N/N	4/4
	P9	**Y/Y**	**Y/Y**	**Y/Y**	**Y/Y**	4/4
	P10	**Y/Y**	**Y/Y**	**Y/Y**	**Y/Y**	4/4
Total		10/9	8/7	9/9	6/4	34/40
% Total		100%/90%	80%/70%	90%/90%	60%/40%	85%
Y/Y Corr (%)		90%	70%	90%	30%	
N/N Corr (%)		0%	20%	10%	30%	
Total Corr (%)		90%	90%	100%	60%	

Condition			Mix Control Desl			
	P11	N/N	N/Y	**Y/Y**	N/N	3/4
	P12	N/N	N/N	**Y/Y**	N/N	4/4
	P13	N/N	**Y/Y**	Y/N	N/N	3/4
	P14	N/Y	N/N	**Y/Y**	N/N	3/4
	P15	N/N	N/N	**Y/Y**	N/N	4/4
	P16	N/N	N/Y	**Y/Y**	N/N	3/4
	P17	N/N	Y/N	**Y/Y**	N/N	4/4
	P18	**Y/Y**	N/N	**Y/Y**	N/N	4/4
	P19	Y/N	N/N	N/Y	N/N	2/4
	P20	N/N	**Y/Y**	**Y/Y**	N/N	4/4
Total		2/2	3/4	9/9	0/0	34/40
% Total		20%/20%	30%/40%	90%/90%	0%/0%	85%
Y/Y Corr (%)		10%	30%	90%	0%	
N/N Corr (%)		70%	40%	10%	100%	
Total Corr (%)		80%	70%	100%	100%	

(Note: vertical labels "Mix protocol" and "Desl protocol" appear in the Mix Control Desl table.)

Notes: #Corr= number of correspondence; FR= funny report; N= No; Part=
participants; S= smile; Y= yes. Blue, gray, green and red background
indicates manipulated jokes.

The results indicated that total correspondence of Y/Y and N/N responses was above

70% for all jokes, except for the Doctor joke in *Control* condition, where correspondence

reached 60% (total correspondence in shown in Table 8 for each joke). In addition, data show

a high number of total correspondences per participants (the rightmost column in Table 8).

Each participants presented an amount of total correspondence (i.e., Y/Y and N/N) in three or

four of the jokes, except P7 and P19 (from *Control* and *Mix Control Desl*, respectively) who

showed in two of the jokes. To better analyze the effect of each joke to produce humor and of

each experimental protocol, data was selected from those participants who smiled and/or

reported the joke as funny.

Figure 6 shows, for each joke, the percentage of participants smiling, reporting the joke

as funny, and showing Y/Y correspondence between both responses. Regarding the *Control*

condition, all participants smiled at the Soccer joke and nine (90%) reported it being funny, so

nine of them (90%) showed Y/Y correspondence. Eight participants (80%) smiled at Job joke,

and only seven participants (70%) reported in the same direction; seven participants (70%)

showed Y/Y correspondence. In the Beer joke, nine participants (90%) smiled and reported

that the joke was funny, with all participants showing Y/Y correspondence between humor

responses. Finally, when the Doctor joke was presented, six individuals (60%) smiled and four

(40%) reported the joke as funny (the Y/Y correspondence between measures was lower and

reached 30%).

Compared to *Control* condition, participants in the *Mix Control Desl* smiled and

reported the joke as funny less, mainly when the protocols were applied. Specifically, after the

Soccer joke with Mix protocol, two participants (20%; $p=.001$) smiled in the and three (30%;

$p=.005$) reported as funny (Y/Y correspondence occurred in only one participant). Also with

the Mix protocol, three (30%) and four (40%) participants smiled and reported the Job joke as

funny (no difference was found between conditions for both measures), with three of them

(30%) corresponding Y/Y responses. When the Beer joke was presented (without any

protocol), no significant differences were found between conditions and nine participants

(90%) smiled and reported in all the same direction. Lastly, in the Doctor joke with

Desliteralization protocol, no participants smiled and responded to the joke as funny

(differences were found only for facial responses, $p=.011$).
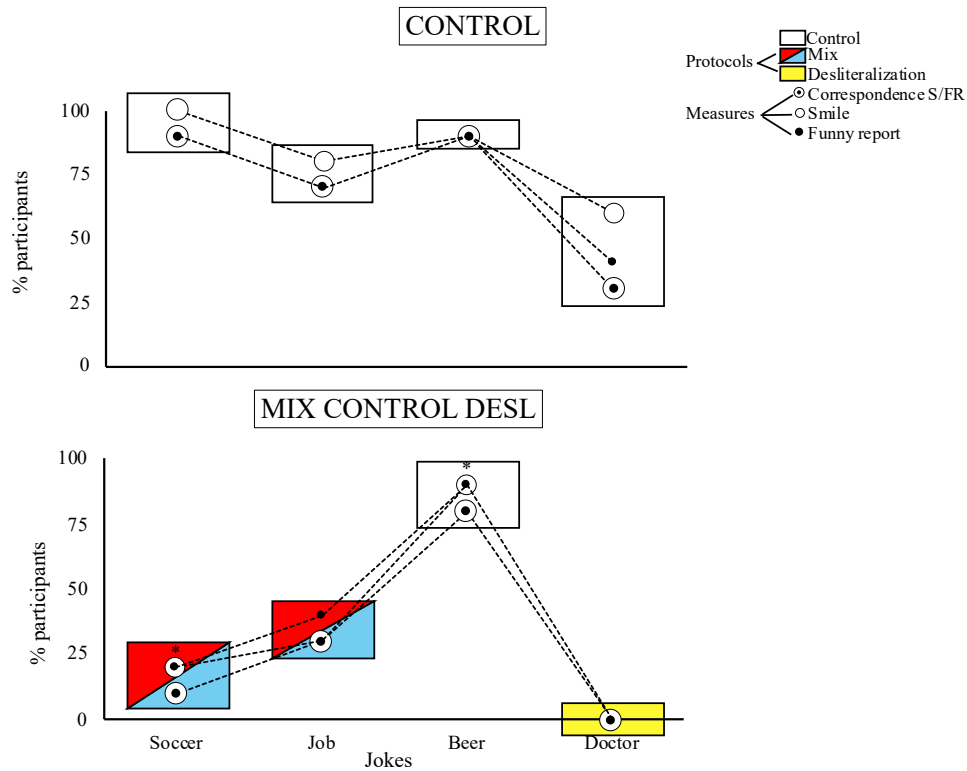
Figure 6. Percentage of smiling, funny report, and the correspondence of smiling and funny report are indicated in the upper and bottom graphs of Control and Mix Control Desl conditions of phase 1, respectively. The red and blue, white, and yellow background measures indicate Mix protocols, Control and Desliteralization protocols, respectively. Asterisks indicate the percentage of smiling and reporting funny, not the correspondence between both

These results indicate that the jokes produced a humor response for almost all the participants in the *Control* condition, but that when they were manipulated with the experimental protocols, they produced less smiling and were considered as less funny. This effect is more evident for the Soccer and Doctor jokes (Mix and Desliteralization protocols, respectively), and to a lesser degree for the Job joke (Mix protocol).

This is consistent with the hypothesis of the previous chapter, showing that identification and discomfort elements when mixed have an important role to disrupt the humor functions of the relational networks involved in the joke. Moreover, this study included the

Desliteralization protocol, which showed that the inclusion of different functions in the joke altered the humorous functions of the joke (Masuda et al., 2004, 2008; Valdivia et al., 2006). Finally, both protocols reduced the humorous properties of the jokes for almost all the participants in the *Mix Control Desl* condition, except for the Job joke in which the effect was less strong, something that could be attributed to participants probably deriving other functions according to their personal history. Given that a variability occurred in the previous study, it is suggested that the specific format of the joke itself might be associated with other functions (e.g., all the dialogue was presented in speech bubbles, differing from the other jokes and activities).

With the same goal of Experiment 1, in Experiment 2 we exposed the participants to two equivalent conditions of the first experiment, except that the jokes order was different. Also, we isolate the two elements of the Mix protocols and generate two different protocols: the Discomfort and Identification protocols. Thus, the Mix, Discomfort and Identification protocols were applied to the same two jokes, in order to compare the different effects in the humor responses. Lastly, the Desliteralization protocol was also replicated to different jokes

3.5. Experiment 2

As mentioned earlier, the absence of humor responses in the participants who were exposed to the Mix protocols might be due to the presence the perspective-taking of I-Now-There with discomfort functions. Experiment 2 was designed to replicate the Mix protocols in different jokes and separate the two elements into two different protocols and apply them to the same jokes. In other words, the application of the three protocols among the same jokes will indicate the components that can alter the humor functions in the joke network.

3.6. Method

3.6.1. Participants

Thirty-eight undergraduates (26 females; age range = 18 – 37) were recruited, compensated for the participation, and debriefed as in Experiment 1. They were randomly assigned to one of four experimental conditions as described in the design.

3.6.2. Setting and Materials

The experiment was conducted individually in the same experimental context as Experiment 1 and using the same materials.

3.6.3. Instruments and Measures

The same instruments and measures were used for this experiment; that is, participants were presented with the same questionnaires (AAQ-II, PT, and STCI-S), jokes, and in between activities. Also, humor measures of recorded facial responses that evaluated by the same Interobserver (IOB) of Experiment 1, and self-reports about jokes was replicated in this Experiment.

3.6.4. Experimental Design

Experiment 2 involved four conditions (see Figure 7). The conditions in Experiment 2 also received four jokes with in between activities but differ of the Experiment 1 in the jokes order. *Control* and *Mix Control Desl* conditions presented firstly Doctor and Beer jokes, followed by Job, and Soccer jokes, and *Disc Control Desl* and *Id Control Desl* conditions only changed the last two jokes order (i.e., ending with Soccer and Job jokes). The Mix, Discomfort, and Identification protocols were exposed separately in three different conditions, preceding

the same Doctor and Beer joke. Then, a third joke was explained without a protocol, followed by the last joke with Desliteralization protocol.

Jokes

	Soccer		Job		Beer		Doctor
Control (N=9)							
Mix Control Desl (N=10)	Mix		Mix				Desl
	Doctor		Beer		Job		Soccer
Disc Control Desl (N=9)	Disc		Disc				Desl
Id Control Desl (N=10)	ID		ID				Desl
	Doctor		Beer		Soccer		Job

Jokes

Figure 7. Experimental design. Jokes are indicated at the bottom and were in the same order for both conditions. Control, and Mix Control Desl, Disc Control Desl, Id Control Desl refers to the named conditions. The white squares correspond to the jokes without any protocol. The red and blue, red, blue, and yellow squares refer to Mix, Discomfort, Identification and Desliteralization protocols, respectively. The grey rectangle with white points indicates the activities in between jokes. Activ = in between activities; Desl= Desliteralization protocol; Disc= Discomfort protocol; ID= Identification protocol; and Mix= Mix protocol.

To sum up, the four conditions differed in the experimental design. A control condition became a control for the effect of the distinct protocols used in the other three conditions. Specifically, the effect of the Mix, Discomfort and Identification protocols occurs in the first jokes, divided into three conditions. Finally, the Desliteralization protocol take place across all non-control conditions in two of the four jokes.

3.6.5. Procedure

3.6.6. Pre-experimental measures

Pre-experimental measures followed the same procedure as the Experiment 1, with the participants filling out the questionnaires (e.g., AAQ-II, IRI, and STCI-S questionnaires), followed by a brief explanation of the purpose of the study. After instructing the participant to press the start button, the experimenter left the room.

3.6.7. Experimental procedure and Protocols

The procedure employed in Experiment 2 was almost identical to that in Experiment 1, except that the jokes order was changed as described in the experimental design. That is, first Doctor and Beer jokes were presented, followed by Job and Soccer jokes (in *Control* and *Mix Control Desl*) or Soccer and Job jokes (*Disc Control Desl* and *Id Control Desl*). Also, the protocols distribution was applied in the same way. That is, Mix, Discomfort and Identification protocols proceeded the first two joke. Then, a not manipulated joke was presented. Lastly, the last joke received the Desliteralization protocol.

The protocols were presented as follows:

Mix protocol

"A patient is about to undergo a surgery... Try to imagine that you are the patient... A patient who is afraid, who has read about the risks involved in the operation... despite his fears, he decides to have the operation... Now, imagine that you are already lying on the operating room table... (a heartbeat starts and still until the joke ended) *you realize that this is not the doctor you were expecting... While you're lying there on the operating table, you look at the surgeon... He is young and seems*

to be inexperienced... You start to feel more afraid... and on top of that, he comes

up to you and says..."

[Then, the Doctor joke was presented].

"Next, you will see two co-workers… Now, try to imagine that you are Juan and

you are helping Luis to quit alcohol ... however, he is also angry about his

continuous irresponsibility at work...... Now, try to imagine that you are Juan... you

are at work, waiting for Luis for the most important meeting of the month...."

[These instructions disappeared after 15 seconds] *At that moment, the managers*

are about to enter the meeting... Luis has not arrived... You get angry and write to

him..." [The instructions disappeared after 5 seconds, and a phone was displayed

simulating Juan texting Luis] *"'Where are you?' I'm waiting for you!!!' 'The*

managers are already here!' 'You know we have a meeting, don't you?' 'Please

tell me yes... I'm fed up with your irresponsibility!'"

[Then, the Beer joke followed].

Discomfort protocol

"A patient is about to undergo surgery.... The patient is afraid. He has read about

the risks involved in the operation... despite his fears, he decides to have the

operation...The patient is lying on the operating room table and realizes that he is

not the doctor he expected... (a heartbeat starts and still until the joke ended). *As he*

lies there on the operating table, he looks at the surgeon... He is young and seems

to be inexperienced... The patient begins to feel more afraid.... and on top of that,

the surgeon approaches the patient and says..."

[Then, the Doctor joke appeared].

"*Next, you will see two co-workers... Juan is helping Luis to give up alcohol... however, he is also angry about his continuous irresponsibility at work... Now, Juan is at work, waiting for Luis for the most important meeting of the month...*" [These instructions disappeared after 15 seconds] "*At that moment, the managers are about to enter the meeting... Luis has not arrived... Juan gets angry and writes to him...*" *...*" [The instructions disappeared after 5 seconds, and a phone was displayed simulating Juan texting Luis] *"'Where are you?' 'I'm waiting for you!!!' 'The managers are already here!' 'You know we have a meeting, don't you?' 'Please tell me yes... I'm sick and tired of your irresponsibility.'*"
[Then, the Beer joke followed].

Identification protocol

"*A patient is about to undergo surgery... Try to imagine that you are that patient... that you have decided to have surgery... Now, imagine that you are already lying on the operating table... While you are there on the operating table, you look at the surgeon... He is young... He comes up to you and says...*"
[Then, the Doctor joke was presented].

"*Next, you will see two co-workers, Juan and Luis... Now, try to imagine that you are Juan, and you are helping Luis to quit alcohol ... Imagine you are at work, waiting for Luis for the most important meeting of the month...*" [The instructions disappeared after 15 seconds] "*At that moment, the managers are about to enter the meeting... Luis is not there... and you write to him...*" [The instructions

disappeared after 5 seconds, and a phone was displayed simulating Juan texting

Luis] *"Where are you?"* [Then, the Beer joke was presented].

Desliteralization protocol

As in the Desliteralization protocol of Experiment 1, the Soccer and Beer jokes were

presented on the computer with added words, letters and colors, and changes in the order of the

sentences (see Figure 8).

After the two manipulated jokes presentation, the third joke was presented without

any manipulation. Then, the fourth joke applied the Desliteralization protocol (see Figure 5).

Finally, the computer screen displayed a message indicating that the experiment was over,

and participants were debriefed.
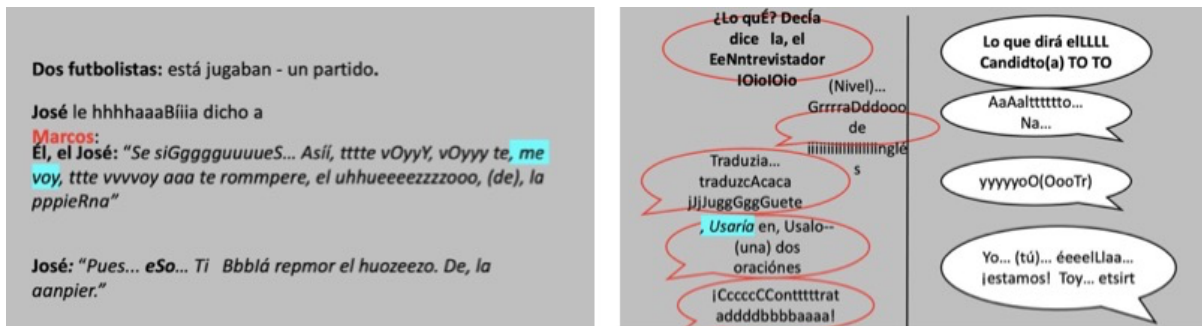
Figure 8: Soccer and Job joke manipulated during the Desliteralization protocol, respectively.

For a comparison between the manipulated and not manipulated Soccer and Job jokes, see

Appendix A

3.6.8. Data analysis

Data analysis in Experiment 2 only differ to compare mean age and the scores of

experimental avoidances, perspective taking, and cheerfulness and seriousness across

conditions, the *t*-student test for independent samples or Analysis of Variance (ANOVA) one-way were applied. The other analyses were identical to Experiment 1.

3.7. Results and Discussion

This section will first present the data from pre-experimental measures and the inter-observer agreement for the presence of a smile during the experiment. Then, we present data of facial and self-reports per condition, as well the correspondence between both measures. The results are discussed according to the components of each protocol and implications of the Experiment 2.

3.7.1. Pre-experimental measures

Table 9 shows the questionnaires mean score for each condition that participants completed before the experimental sequence (individual data are available upon request to the first author). Analysis of Variance (ANOVA) showed no statically significant differences between conditions in any of the measures: the AAQ-II, with $F_{(3.34)}= 2.01$ the PT scale of the IRI, with $F_{(3.34)}= 1.90$; the CH scale of the STCI-S, with $F_{(3.34)}=.39$; and the SE scale of the STCI-S, with $F_{(3.34)}=1.83$. These results indicate that both conditions were homogeneous regarding these measures.

Table 9.
Comparison between conditions in pre-experimental measures

Measures	Control		Mix Control Desl		Disc Control Desl		Id Control Desl		p
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
AAQ-II	27.1	10.2	26	8.8	23.3	8.8	18.1	5.4	.105
IRI (PT scale)	27.6	2.2	26.9	2.4	27.4	4.3	30.1	2.9	.109
STCI-S (CH scale)	114	16.2	114.6	15.4	118.6	15.5	120.9	16.2	.742
STCI-S (SE scale)	83.9	14.7	80.8	8.9	90.4	13.1	86.5	14.2	.425

3.7.2. Interobservers Agreement

The procedure analysis with the same trained observer was the same from Experiment

1.

As in the Experiment 1, Ob1 was the only one that evaluated all the video-recorded

faces. In contrast, Ob2 and Ob3 evaluated 15 and 17 different participants in a separate room

over five days, respectively (the specific data regarding interobserver agreement is available

upon request of the first author).

Table 10 indicates the kappa coefficient for each pair of observers. Kappa values ranged from

0.85 to 1, which shows an almost perfect agreement (Landis & Joch, 1977). Therefore, these

results assure that face responses were adequately measured.

Table 10.

Kappa for interobserver agreement.

	Ob1 x Ob2	Ob1 x Ob3
Kappa values	0,97	0,94

3.7.3. Effects of the Experimental Protocols

Table 11 shows the facial responses, self-reports, and correspondence between them for

participants in the four conditions, with data from *Control* and *Mix Control Desl* conditions

displayed in the upper left and right panel, respectively, and from the *Disc Control Desl* and *Id*

Control Desl conditions in the lower left and right panel. As in Experiment 1, Table 11 shows

the exact measures of Table 11 of Experiment 1. That is, whether the participant smiled or not

if it was considered the joke as funny or not (indicated with Y or N for both measures), and the

total correspondences between facial responses and self-reports for each joke (named as Y/Y

correspondence when smiling and reporting funny, and N/N correspondence when the opposite

responses).

The total number of Y/Y and N/N correspondence in *Control* and *Mix Control Desl*

conditions was above 70% in almost jokes, except in the Beer joke of *Control*, which was 67%.

In contrast, the correspondence of Y/Y and N/N responses in *Disc Control Desl* was less than

70% in three of the four jokes; 56% of the participants corresponded responses in the jokes

with Discomfort protocols, 67% for the joke with any protocol. Finally, the *Id Control Desl*

condition showed a total of Y/Y and N/N correspondence less than 70% in the jokes with

Identification protocols. Thus, 60% and 67% of participants corresponded to the Doctor and

Beer joke (Total correspondence in Table 11 for each joke). As in Experiment 1, data was

selected from participants who smiled and reported the joke as funny and the Y/Y

correspondence.

Figure 9 shows, for each joke, the percentage of participants smiling, reporting the joke

as funny, and showing Y/Y correspondence. Regarding *Control*, data was as follows (see

Figure 9, the upper graph). In the nine participants of *Control*, eight and nine participants (89%

and 100%) smiled and reported the Doctor Joke as funny (eight participants corresponded both

responses), and eight and five (89% and 56%) smiled and informed that the Beer joke was

funny, respectively (Y/Y responses corresponded in five participants). In the Job joke, six

participants (67%) smiled and reported the joke as funny (all corresponded smile response and

funny report). When the last joke was presented, only three participants (33%) smiled, and one

(11%) reported the Soccer joke as funny, respectively (Y/Y correspondence occurred in only

one participant).

Looking at the *Mix Control Desl* condition (see the upper second graph of Figure 9),

the 10 participants presented fewer humor responses in the jokes with protocols. The humor

responses presence in the Doctor joke with the Mix protocol contrasts with Control, revealing

that only two participants (20%; $p=.005$) smiled, but no participants reported the Doctor joke

as funny ($p<.001$). In the Beer joke with the same protocol, the absence of smile ($p<.001$) and

funny report ($p=.011$) was complete among all the participants. In the Job joke without protocol, six and nine participants (60% and 90%) smiled and reported in the same direction (no difference was found). Lastly, only one participant (10%) smiled and reported the joke as funny in the Soccer joke with the Desliteralization protocol (no significant difference was found.

Table 11.

Facial responses and self-reports across all participants, jokes, and conditions.

Condition	Control					Mix Control Desl					
Partic	Doctor S/FR	Beer S/FR	Job S/FR	Soccer S/FR	#Corr	Partic	Doctor S/FR	Beer S/FR	Soccer S/FR	Job S/FR	#Corr
P21	N/Y	Y/Y	N/N	N/N	3/4	P30	N/N	N/N	N/Y	N/N	3/4
P22	Y/Y	Y/N	Y/Y	Y/N	2/4	P31	N/N	N/N	Y/Y	N/N	4/4
P23	Y/Y	N/N	Y/Y	N/N	4/4	P32	N/N	N/N	Y/Y	N/Y	3/4
P24	Y/Y	Y/N	N/N	Y/N	3/4	P33	N/N	N/N	N/N	N/N	4/4
P25	Y/Y	Y/Y	Y/Y	N/N	4/4	P34	N/N	N/N	N/Y	N/N	3/4
P26	Y/Y	Y/Y	Y/Y	Y/Y	4/4	P35	Y/N	N/N	Y/Y	N/N	3/4
P27	Y/Y	Y/Y	N/N	N/N	4/4	P36	N/N	N/N	N/Y	N/N	3/4
P28	Y/Y	Y/Y	Y/Y	N/N	4/4	P37	N/N	N/N	Y/Y	Y/N	3/4
P29	Y/Y	Y/N	Y/Y	N/N	3/4	P38	N/N	N/N	Y/Y	N/N	4/4
						P39		Y/N	Y/Y	N/N	3/4
Total	8/9	8/5	6/6	3/1	31/36		5/3	2/0	6/9	1/1	33/40
% Total	89%/100%	89%/56%	67%/67%	33%/11%	86%		56%/33%	20%/0%	60%/90%	10%/10%	83%
Y/Y Corr (%)	89%	56%	67%	11%			22%	0%	60%	0%	
N/N Corr (%)	0%	11%	33%	67%			33%	80%	10%	80%	
Total Corr (%)	89%	67%	100%	78%			56%	80%	70%	80%	

Condition	Disc Control Desl					Id Control Desl					
Partic	Doctor S/FR	Beer S/FR	Job S/FR	Soccer S/FR	#Corr	Partic	Doctor S/FR	Beer S/FR	Soccer S/FR	Job S/FR	#Corr
P40	Y/N	N/N	N/Y	N/N	2/4	P49	N/N	N/N	Y/Y	N/N	4/4
P41	Y/Y	Y/Y	Y/Y	N/N	4/4	P50	Y/Y	Y/N	Y/Y	N/N	3/4
P42	Y/N	Y/N	Y/N	N/N	1/4	P51	Y/N	Y/Y	N/N	N/N	3/4
P43	N/N	Y/Y	Y/Y	N/N	4/4	P52	Y/N	Y/N	N/N	N/N	2/4
P44	N/N	Y/Y	Y/Y	N/Y	3/4	P53	Y/Y	N/N	Y/Y	N/N	4/4
P45	Y/Y	Y/N	Y/Y	N/N	3/4	P54	N/Y		Y/N	N/N	1/3
P46	Y/N	N/N	Y/Y	N/N	3/4	P55	Y/Y	Y/Y	Y/Y	Y/N	3/4
P47	N/Y	N/Y	N/Y	N/N	1/4	P56	N/N	N/N	N/Y	N/N	3/4
P48	N/N	Y/N	Y/Y	N/N	3/4	P57	Y/N	Y/Y	Y/Y	N/N	3/4
						P58	Y/Y	Y/N	Y/Y	N/N	3/4
Total	5/3	6/4	7/8	0/1	24/36		7/5	6/3	7/7	1/0	29/39
% Total	56%/33%	67%/44%	77%/88%	0%/11%	67%		70%/50%	67%/33%	70%/70%	10%/0%	74%
Y/Y Corr (%)	22%	33%	67%	0%			40%	33%	60%	0%	
N/N Corr (%)	33%	22%	0%	89%			20%	33%	20%	90%	
Total Corr (%)	56%	56%	67%	89%			60%	67%	80%	90%	

Notes: #Corr= number of correspondence; FR= funny report; N= No; Part= participants; S= smile; Y= yes. Blue, gray, green and red background indicates manipulated jokes.

As in Experiment 1, participants in the *Control* condition showed a higher percentage of smiling and reporting the jokes as funny than participants exposed to the condition with experimental protocols (i.e., Mix and Desliteralization protocols). These protocols reduced the smiling and reporting funny in almost all the participants exposed to them.

Data from *Disc Control Desl* and *Id Control Desl* conditions also show that the protocols reduced humor responses among participants in these conditions (see Figure 9 bottom two graphs, respectively). When the Discomfort protocol was applied to the nine participants in the *Disc Control Desl,* five and three participants (56% and 33%) smiled and reported in the same direction in the Doctor Joke, respectively, with two of them (22%) corresponding

humorous measures (contrasts with joke in the *Control* was significant only for funny report, *p*=.009). In the Beer joke with the same protocol, six and four participants (67% and 44%) did in the same direction (there was no significance compared to the Beer joke of the *Control* condition in both measures); three participants (33%) presented Y/Y correspondence. Different from the Control condition that presented Job joke after the Beer joke, *Disc Control Desl* exposed the Soccer joke without protocols, and seven and eight participants (77% and 88%) respectively smiled and reported funny, in which six of them (67%) presented Y/Y correspondence. Finally, in the Desliteralization protocol applied to the Job joke, eight participants (89%) corresponded in the absence of humor measures, and only one reported the joke as funny.

Concerning to *Id Control Desl* condition, the Doctor joke with Identification protocol, seven and five participants (70% and 50%) smiled and reported the joke as funny (Identification protocol was statically significant only for self-report in relation to *Control*, *p*=.033); Y/Y correspondence occurred in four participants (40%). In the Beer joke with the same protocol, six and three participants (67% and 33%) smiled and reported in the same direction, respectively, and three of them (33%) presented Y/Y responses (no significant difference was found compared to the same joke of *Control* condition). As in the *Disc Control Desl*, the Soccer joke was presented with any protocol; seven participants (70%) smiled and reported the joke as funny, with six of them (60%) presenting Y/Y correspondence (no significant differences were found between conditions). Lastly, in the Job joke with the Desliteralization protocol, humor measures were found only in the face reaction of one participant (there was no significant difference between *Disc Control Desl* and *Id Control Desl* conditions).
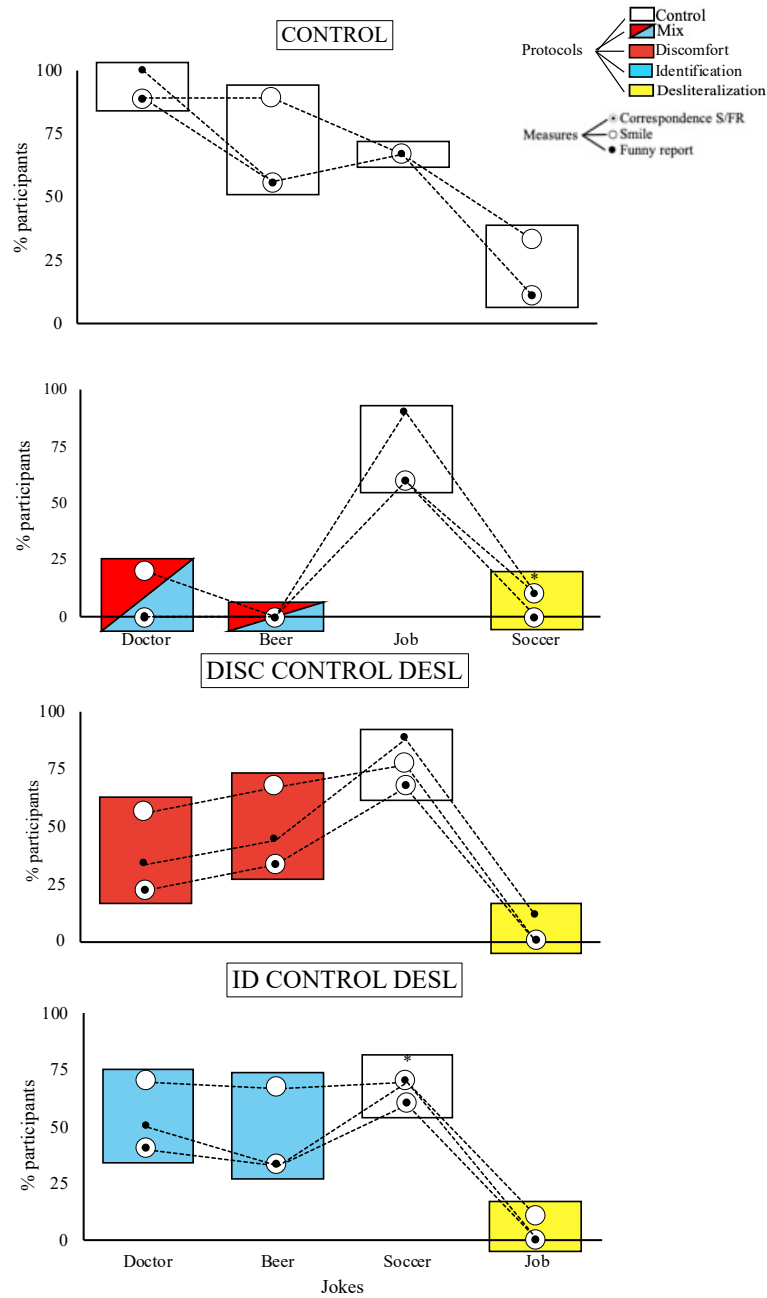
Figure 9. Circles refers to the same meaure of Figure 2. The colored rectangles background measures refer to the same protocols of Experiment 1 (see Figure 2). The addition of red and blue background measures indicates to Discomfort and Identification protocols, respectively. Asterisks indicate the percentage of smiling and reporting funny, not the correspondence between both.

Data from Discomfort and Identification protocols revealed that the smiling and reporting of the jokes as funny of the participants was lesser to the same jokes in the *Control* condition. Looking at facial responses and self-reports in these protocols, they pointed to different directions in the participants, resulting in a higher non-correspondence of measures. When in the last two jokes, data show a similar pattern in the smile and funny report presence when the joke has no protocols and for the manipulated joke with the Desliteralization protocol.

To sum up, jokes in both *Control* conditions of Experiment 1 and 2 showed a similar pattern, in which most subjects smiled at the jokes, but almost did not in the last one. The decreasing humor response in the last joke is in line with the previous study, who suggested that the sequence and timing of the presentations of all the jokes to the same participant might generate a carry-over effect experimental design. The evidence of mixed elements in Experiment 2 points to the same direction of Experiment 1, which shows that the mixed elements of I-Here-Now with discomfort feelings are important elements to impact in the individuals' humor responses. However, when separated the mixed elements in Discomfort and Identification protocols, it showed less impact on the reduction of humor responses than when mixed. Interestingly, when looking at the correspondence between facial reaction and self-report, the correspondence of measures occurred in lesser degree in Discomfort and Identification protocols. Finally, in the last two jokes, where one was not manipulated and the other exposed with the Desliteralization protocol, all the conditions (included from Experiment 1) showed a consistent pattern 1. Most participants smiled when the third joke was presented, and an almost total absence was found in the jokes with the Desliteralization protocol.

3.8. General Discussion

The current study aimed to analyze the impact of the protocol on the individuals' humor response when a joke is presented. Specifically, Experiments 1 and 2 applied the same

four jokes in different orders, with two conditions in Experiment 1 and the inclusion of two

new conditions in Experiment 2. The results of the jokes without protocol showed that a high

number of participants smiled at the jokes. The findings of Mix and Desliteralization

protocols reveal a high impact in the alteration of humor responses in the participants. In

contrast, Identification and Discomfort protocols decreased the participants' humor

responses, but to a minor degree. We will first comment on the results of the jokes exposition

and the effects of each protocol; then, we will address the discussion of these effects.

Experiments 1 and 2 obtained the measures by facial reaction and self-reports of the

jokes with or without protocols. The findings are summarized as follows. Firstly, most

participants smiled at almost all jokes without protocols in Experiments 1 and 2. This result

replicates the previous studies presented where these jokes were evaluated as funny for these

University students in the South of Spain. Importantly, when the Doctor and Soccer jokes

were presented as the last jokes in Control 1 and 2, respectively, an inverse finding appeared,

and most participants did not smile at the jokes. This finding suggests that presenting four

jokes in this experimental design might influence the humor response (i.e., a carry-over effect

discussed in the previous chapter).

Secondly, the findings of experimental protocols showed a reduction in the smiling at

the jokes of the participants. Specifically, three of the four jokes exposed to the Mix protocols

showed significant and replicable changes in participants' responses to the jokes. When the

elements of Mix protocol (i.e., perspective-taking and discomfort functions) were divided

into two protocols, the Discomfort and Identification protocols showed significance only in

the funny report of the Doctor joke. Finally, when adding new functions to the joke network,

almost all the participants neither smiled at the three jokes, nor reported them as funny with

the Desliteralization protocol.

Thirdly, the participants corresponded to the facial responses (smiling or not) and self-reports (reporting the joke as funny or other sensation) in almost all the jokes exposed. The no correspondence between the responses of the participants occurred when: (1) the Beer joke was presented as the second joke in the Control condition of Experiment 2; (2) the last jokes without protocols were presented in the Control conditions (i.e., the Doctor and Beer jokes); and (3) the jokes with the Discomfort and Identification protocols, most of the participants smiled at the jokes but did not report them as funny.

The present study added greater experimental control than the previous study, and some aspects are worth mentioning for the humor derivation analysis. Firstly, we implemented two *Control* conditions for the four experimental conditions, which allowed for the comparison of the Mix protocol's effects across all jokes. Moreover, the four conditions of Experiment 2 enabled the analysis of the differential impact of the Mix, Discomfort, and Identification protocols in the Doctor and Beer jokes. Secondly, we addressed the Mix, Discomfort, and Identification protocols were addressed in different conditions, while in the previous study, all the three protocols – Reality, Identification, and Discomfort - were applied in the same condition. Finally, a new protocol was added to the last joke in order to avoid the carry-over effect in the response of the participants (i.e., the Desliteralization protocol).

The analysis of the Mix protocol in all the jokes, and the Mix, Discomfort, and Identification protocols in the same two jokes of Experiment 2, requires mentioning that the impact of the protocols was not equal for all of the participants, which indicates that the relevant variable it is not the protocol *per se* but the function that the protocol generated in interaction with the personal history of the individual. In this study, we did not measure or manipulate the participants' personal history; possibly, part of this between subjects variability is related to those repertoires involved in understanding the protocol in interaction with the joke. In addition, there may be intrasubject variability, in which the individual

laughs at one joke but not at another. This type of variability could be related to how the function of each joke interacts with a personal repertoire that would be valid for one joke and not for another (since it is the individual). The change of perspective would occur in both, but it could be that the change of perspective is contextualized to specific functions and not others. For instance, when invited the participants as if he/she were the patient, but for he/she it is complicated to do it with an insecure surgeon (i.e., Mix protocol applied to the Doctor Joke), while it is uncomplicated for he/she to be in the "skin" of a colleague friend helping someone with problems (i.e., Mix protocol applied to the Beer joke). So, the contextual variability which, again, is present in each person and makes it possible for one to take perspective, situate oneself, or change roles, depends on the functions present for each one according to personal history.

With this in mind, regardless of personal history, the findings of the Mix Protocol suggest that the deictic relations of I-Now-There, with discomfort functions established by the protocol, might exercise a contextual control for the participants' who not showed humor responses. It appears that introducing the Mix protocol before the jokes, in which the listener is in the "skin" of the joke character, occurring now, and incorporating that this character is having a bad moment, was sufficiently dominant to influence people with different personal histories, impacting in the smile responses and funny reports of the participants in all the jokes. In this protocol, we could not isolate which of the two functions has a more profound impact on the joke network, and then determine which of the two has generated the transform of humorous functions in the joke. This is so because both elements go together: the perspective cues and the motivational function changes (i.e., discomfort functions) of the contents of the joke. From the lens of RFT, the joke network that is coherent, complete, meaningful, but incongruous (Stewart et al., 2001) might not occur or at least conflict with the Mix protocol elements.

To solve the problem of which function (i.e., perspective-taking or discomfort functions) is more relevant to disrupting the humorous function of the joke, we separated both functions into two different protocols. When the discomfort and deictic framings of I-Here-Now functions were separated in two different protocols to the Doctor and Beer jokes in Experiment 2, a lesser impact on the participant's responses were observed. Specifically, in the Discomfort protocol, we only placed the character in a negative situation (i.e., a motivational state of Other-There-Then with discomfort functions), and most participants also smiled at the jokes. This suggests that the participants needed a Here-Now perspective cue with the joke character Here-Now to alter the humor responses effectively. On the other hand, perhaps at least for these participants than the transformation of function from I to Other is not fluency enough. Looking at the Identification protocol, framing the joke as if the listener is in the "skin" of the character, that is as if occurring with ME, but without incorporating any functions, most participants smiled at the jokes. This result suggests (1) that participants were not fluent enough in the PT of the other, or (2) if they were fluent enough, at least aversive functions might be needed to alter the derivation of humor.

Thus, when a joke generates humorous responses, it seems that the subject has to take some perspective on the story's context. Possibly, the functions of the conventional network, reinforced via community, are not activated because of the perspective-taking of such network. On the other hand, perhaps we can literalize the functions, but with some perspective of the situation. That is, we are not analyzing when the humor response is altered but when it is produced (for a review in humor production, Ruch, & Heintz, 2019). Hence, for a joke to be funny, people must have a repertoire of taking perspectives from distinct or opposite networks that collapse into one. Future studies should consider such suggestions for other types of experimental manipulations.

Moreover, some questions emerge when analyzing the role of perspective-taking and discomfort functions. Regarding the Doctor joke, what would happen if we moved the perspective to the surgeon instead of the patient's perspective? In the case of the Beer jokes, what would happen if, instead of the anger of the person with his job colleague, we take the perspective of another person with appetitive functions out of the situation? Considering that we invited the participants to take the perspective of themselves in the patient's or the job colleague's "skin" because there is less complexity in perspective taking (see Barbero-Rubio et al., 2016), what if we had introduced a loved one as a patient and we look at this loved person in this situation? Or someone we did not know? Or, why not, someone we do not like, would we laugh? Future studies may move towards answering these questions.

Finally, looking at the Desliteralization protocol, the results showed that the humor derivation was altered in almost all participants by adding new functions to the joke network. When repeating words, adding colors, altering words, time, and joke sentences, the results suggest that the joke network was disrupted; it was not functionally present. The inclusion of new functions was coherent with previous studies where the Desliteralization protocols have shown to alter the aversive functions of words (Masuda et al., 2004; Valdivia et al., 2006; Masuda et al., 2008; Masuda et al., 2010), which also points to an alteration of functions, but in this case humor functions. Importantly, some authors in the behavioral science literature pointed out (Hayes et al., 1999; Vilatte et al., 2016) that humor is a useful therapeutic tool to deliteralize the aversive words that generate an inflexibility repertoire. It is worth saying that the purpose of the Deliteralization protocol developed here is different from the purpose of humor in therapy, which aims to deliteralize the aversive words in therapy (Hayes et al., 1999). However, the results of the deliteralized joke pointed to the same direction of Desliteralization of aversive thoughts in therapy, disrupting the words' functions. Possibly, the desliteralization is altering the perspective, which in turn does not allow for the

emergence of the intended functions of the joke. Therefore, the Desliteralization protocol was not modifying any functions with the presentation of the joke. What the individual was seeing when the joke was presented, it was not allowing the activation of any network in the joke. In other words, what was happening was that when a joke was deliteralized, the functions that emerge in the Here-Now and are connected to the personal history with different networks, were altered. That is, the meaning of medicine, why the patient was there, or the meaning of a job, why the candidate wanted the job, and so on - all the functions in the joke network, when deliteralized, did not existed.

Interestingly, perhaps in the Job joke, when humor responses emerged in more individuals and no significant differences were found between the control condition of Experiment 1, a deliteralizated process occurred after the application of Mix protocol, but inversely. The humor presence in 3 of 10 participants possibly emerged because of the format in which the Mix protocol and Job joke were presented. Regarding the Mix protocol, all the protocol sentences were presented simultaneously, and once the participant clicked the continue button, the joke was exposed. Perhaps, the pace of the participant's reading and pressing the continue button altered the functions that should be present at the moment of the joke. Moreover, the format of the Job joke, in which participants read the joke in the speech bubble form (unlike the other dialogues presented to the participant in the experiment), may have influenced the participants to smile. Future research might consider those aspects when investigating humor behavior.

That is, the complexity of functional relation in a joke is very huge. In this study, just two functions were manipulated, the perspective and the motivational state of discomfort in the joke. Producing a change in the function of the joke's context, either by including deictic and uncomfortable functions or by adding functions to the networks, changed the joke's content. If we include the perspective with discomfort functions, the joke stops being funny.

When we deliteralized the network of the joke, the appetitive functions were not activated

and, therefore, there was no joke.

The present study is the first that has replicated and analyzed the effects of deictic

framings with discomfort functions in humor derivation by measuring face reactions.

Moreover, the impact in the humor responses of the deictic framing (I-Here-Now) with

discomfort functions in the joke was explicitly presented both mixed and separated for the

first time in the current study. Future research might analyze how the combination of

different deictic framing (e.g., Other-There-Then) with other functions might impact humor

emergence. This analysis allows a broader comprehension of the elements that can impact the

derivation of humor. Finally, the effects measured by facial expressions and self-reports

showed that most participants responded in the same way, which is also encouraged to be

used in future research.

Some limitations of the current study are worth mentioning. As in the previous study,

we discussed that the most relevant is that the sequence and timing of the presentations of all

the jokes to the same participant might have generated carry-over effects, mainly in the

Control conditions. As already stated, this study did not measure the fluency in perspective

taking of participant's personal history. This measure would allow a more precise analysis

regarding the personal history of each individual for the emergence of humor. Moreover, the

measures of pre-experimental questionnaires showed that the participants did not differ

concerning to the measured repertoires across conditions. However, these measures did not

constitute good metrics of the self-rules about the personal history of the individual in

interaction with the components of the jokes or about the flexibility in relating and

transforming functions; for example, for one perspective to another in agent (I-You), place

(Here-There), and time (Now-Then).

In conclusion, this study adds empirical evidence of the impact of deictics I-Here-Now with discomfort functions in altering the humor derivation. The results showed that mainly two protocols were effective: (1) the so-called Mix protocol established a context to the four jokes by framing the deictic of I-Here-Now with discomfort functions; and (2) the Desliteralization protocol added new functions in the joke network. Further studies on humor are encouraged to replicate those elements and modify them to explore the potential of different elements, either for preventing or promoting the emergence of humor (e.g., what might be the case by changing the deictic framing to Other-There-Then with appetitive functions?). The present study contributes to comprehending the elements that might be present when someone does not smile at a joke.

PHASE 2 – RE-EXPOSED JOKES WITHOUT PROTOCOLS

3.9. Introduction

Experiments 1 and 2, presented previously, showed how the impact of the protocol in the humor responses compared to jokes without any protocol. With a similar procedure to the previous chapter, participants continued the experiment by doing a second phase with the same jokes but without any protocol, termed "phase 2" here. Participants who were exposed to the jokes without any protocol were re-exposed to them, while the others who received the jokes with protocols had the jokes without protocols for the first time. In this part of the chapter, we will call the first part of Experiments 1 and 2 as phase 1 to better discriminate with the re-exposed jokes in phase 2.

3.10. Experiment 1

The participants in phase 2 were the same from phase 1. As in phase 1, the experiment was conducted individually in the same context, with the same materials. No instruments

were applied before phase 2. Humor measured of recorded facial responses were evaluated by

the same IOB of phase 1, and self-reports about jokes was also replicated in this phase.

3.11.   Method

3.11.1. Experimental design

The experimental design of phase 2 included the same conditions as in phase 1with four

jokes in-between activities (see Figure 10). Participants in the *Control* condition were re-

exposed to the jokes without any protocols, with participants in the *Mix Control Desl* condition

were exposed to the same jokes in the same order, without any protocols (i.e., as in the Control

condition). Thus, the jokes Soccer, Job, and Doctor in the *Mix Control Desl* were presented

without any protocol for the first time to the participants, and Beer jokes were exposed as in

phase 1.

3.11.2.   Procedure

3.11.2.   Experimental procedure

Phase 2 started after a 10-minutes break from phase 1. It was conducted individually

and laster approximately 30 minutes. In both conditions, participants were exposed to the same

four jokes without protocols and in the same order of phase 1 (i.e., Soccer, Job, Beer, and

Doctor). Figure 7 shows the sequence of jokes presented to the participants. That is, all the

jokes were re-exposed in the same way in the *Control* condition, while the Soccer, Job, and

Doctor jokes were presented without the experimental protocols in the *Mix Control Desl* for

the first time in phase 2 (the Beer joke were presented as in phase 1). Finally, when all the jokes

had been presented, a message appeared in the computer screen indicating that the experiment

was over and participants debriefed.
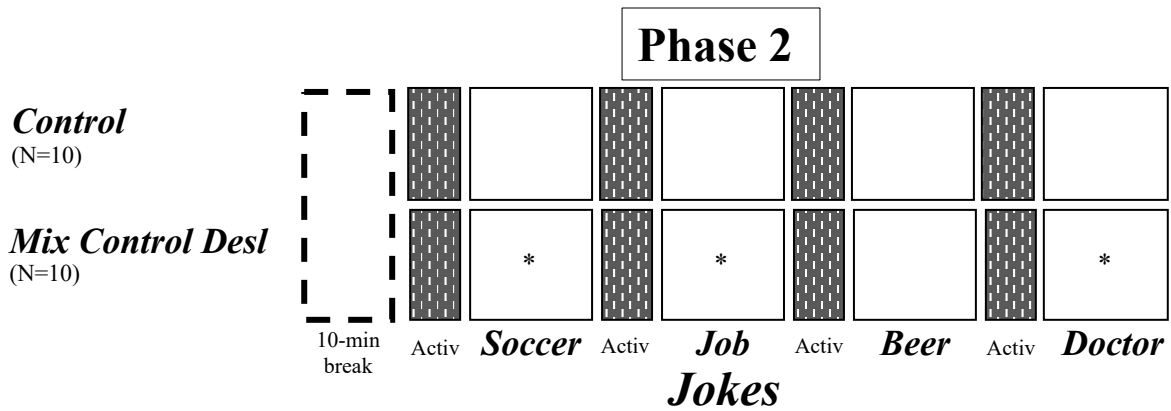
Figure 10. Experimental design in phase 2. Jokes are indicated in the bottom were in the same order for both conditions. Control and Mix Control Desl refers to the named conditions. The white squares correspond to jokes without protocols. The asterisks inside of the squares indicates the jokes that were presented without protocols for the first time. Activ = in between activities.

3.11.3. Interobservers Agreement

The procedure analysis with the trained observer was the same from phase 1.

As in phase 1 of Experiment 1, Ob1 was the only one that evaluated all the video-recorded faces. In contrast, Ob2 and Ob3 Ob3 evaluated 10 and 8 different participants in a separate room over five days, respectively (the specific data regarding interobserver agreement is available upon request of the first author).

Table 12 indicates the kappa coefficient for each pair of observers. Kappa values ranged from 0.85 to 1, which shows an almost perfect agreement (Landis & Joch, 1977). Therefore, these results assure that face responses were adequately measured.

Table 12.

Kappa for interobserver agreement.

	Ob1 x Ob2	Ob1 x Ob3
Kappa values	0,97	0,94

3.11.4. Data analysis

The same data analysis described for phase 2 of Experiment 1 were performed for phase 2 of Experiment 1.

3.12. Results and Discussion

Results regarding facial responses and self-reports are reported per condition, as well as the correspondence between both measures. Results are then discussed for each re-exposed joke.

3.12.1. Effects re-exposed jokes

Table 13 shows the same individual measures per condition (i.e., facial responses, self-reports, and correspondence between) as Table 8, but it is from phase 2 of Experiment 1. Data from the *Control* condition is displayed in the upper panel, and the *Mix Control Desl* condition is in the lower panel. For each joke, Y or N indicates whether the participant smiled or not and considered the joke as funny or not. When in correspondence, Y/Y correspondence refers to participants who smiled and at the same time reported the joke as funny, whereas N/N correspondence indicates the participants who did not smile and at the same time reported other sensations.

Data from phase 2 shows that the total correspondence of Y/Y and N/N responses decreased considerably concerning phase 1. Only the Beer joke of the *Control* condition presented a total correspondence of 80%, while the other jokes presented a 60% correspondence between measures. Regarding the *Mix Control Desl*, where three jokes were presented without any protocol for the first time, total correspondence was 70% for Soccer and Beer joke, while the Job and Doctor joke presented 60% of correspondence. In the same line, the results show fewer total correspondences per participant (the rightmost column in Table

13). Five participants in the Control condition presented an amount of total correspondence in three or four jokes. In contrast, P2, P3, and P6 presented an amount of correspondence between measures in two jokes, and P1 and P9 did in one and none jokes, respectively. In the *Mix Control Desl*, also five participants showed correspondence between measures in three or four opportunities. Two participants presented an amount of correspondence in two (P13 and P16) and one (P12 and P17) joke; only P14 did not show correspondence between facial responses and self-report. As in phase 1, data was selected from those participants who smiled and reported the joke as funny.

Figure 11 shows, for each joke, the percentage of participants smiling, reporting the joke as funny, and showing Y/Y correspondence between both responses (upper and bottom graphs refer to *Control* and *Mix Control Desl*, respectively). Concerning the *Control* condition, two participants (20%) smiled at the Soccer joke, and six (60%) reported it being funny; the two of the participants (20%) who smiled also reported it as funny. Five participants (50%) smiled and reported the Job joke as funny, but only three of them showed Y/Y correspondence. Five participants (50%) smiled at the joke in the Beer joke, and seven reported that the joke was funny, with all participants (50%) who smiled showing Y/Y correspondence. Finally, when the Doctor joke was presented, one individual (10%) smiled, and five (50%) reported the joke as funny (the Y/Y correspondence between measures was in only the participant who smiled at the joke, 10%).

Table 13.

Facial responses and self-reports across all participants, jokes, and conditions of phase 2.

Condition		Control				
	Partic	Soccer S/FR	Job S/FR	Beer S/FR	Doctor S/FR	#Corr
	P1	**Y/Y**	N/Y	N/Y	N/Y	1/4
	P2	N/Y	Y/N	**Y/Y**	**Y/Y**	2/4
	P3	N/N	Y/N	**Y/Y**	N/N	2/4
	P4	**Y/Y**	**Y/Y**	**Y/Y**	N/Y	3/4
	P5	N/N	N/N	N/N	N/N	4/4
	P6	N/Y	**Y/Y**	**Y/Y**	N/Y	2/4
	P7	N/N	N/N	N/N	N/N	4/4
	P8	N/Y	**Y/Y**	**Y/Y**	N/N	3/4
	P9	N/Y	N/Y	N/Y	N/Y	0/4
	P10	N/N	N/N	N/N	N/N	4/4
Total		2/6	5/5	5/7	1/5	25/40
% Total		20%/60%	50%/50%	50%/70%	10%/50%	63%
Y/Y Corr (%)		20%	30%	50%	10%	
N/N Corr (%)		40%	30%	30%	50%	
Total Corr (%)		60%	60%	80%	60%	
Condition		**Mix Control Desl**				
	P11	N/N	N/Y	**Y/Y**	N/N	3/4
	P12	Y/N	N/N	**Y/Y**	**Y/Y**	1/4
	P13	N/N	N/Y	**Y/Y**	N/Y	2/4
	P14	N/Y	N/Y	N/Y	N/Y	0/4
	P15	N/N	N/N	N/N	**Y/Y**	4/4
	P16	N/N	**Y/Y**	N/Y	N/Y	2/4
	P17	N/Y	**Y/Y**	N/Y	N/Y	1/4
	P18	N/N	N/N	**Y/Y**	N/N	4/4
	P19	N/N	N/Y	N/N	N/N	3/4
	P20	N/N	N/Y	**Y/Y**	N/N	3/4
Total		1/2	2/7	5/8	2/6	23/40
% Total		10%/20%	20%/70%	50%/80%	20%/60%	58%
Y/Y Corr (%)		0%	20%	50%	20%	
N/N Corr (%)		70%	20%	20%	40%	
Total Corr (%)		70%	40%	70%	60%	

Notes: #Corr= number of correspondences; FR= funny report; N= No; Part= participants; S= smile; Y= yes. Blue, gray, green and red background indicates manipulated jokes.

Results from *Mix Control Desl* were not statistically significant in any measure compared to *Control*, so data were as follows. When the Soccer joke was presented without Mix protocol, one participant (10%) smiled, and two (20%) reported it as funny; no participant presented Y/Y correspondence. In the Job joke, two (20%) and seven (70%) participants smiled and reported the Job joke as funny when the joke was presented without a protocol for the first time; participants who smiled also reported it as funny (20%). When the Beer joke was exposed as in phase 1, five participants (50%) smiled, and eight (80%) reported in the same direction;

participants who smiled also reported as funny (50%). Lastly, in the Doctor joke now presented

without Desliteralization protocol, two participants (20%) smiled and presented Y/Y responses,

and six (60%) responded to the joke as funny.
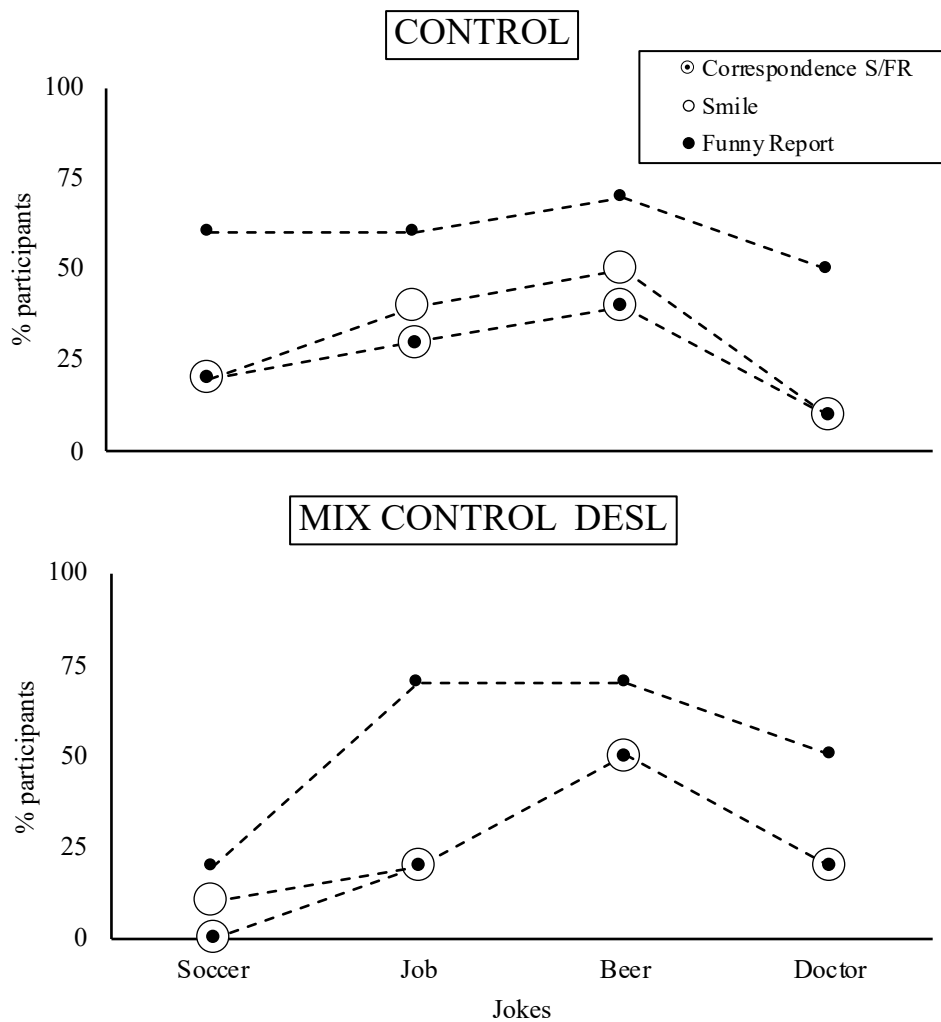
Figure 11. Percentage of smiling, funny report, and the correspondence of smiling and funny

report of phase 2 are indicated in the upper and bottom graphs of Control and Mix Control Desl

conditions, respectively.

        Data obtained in phase 2 reveal a reduction in smiling responses in both conditions,

either when they were re-exposed to the jokes or when they received the jokes for the first time

without being preceded by Mix protocols. Only the Doctor joke, presented first with Desliteralization protocol, showed a slight increase in smiling responses. Participants presented a slight decrease in the funny report when the re-exposed jokes were presented. Conversely, funny reports increased in the Job and Doctor jokes first presented with Mix and Desliteralization protocols (the Soccer joke without Mix protocol presented a similar pattern of phase 1).

The results of the present study show a similar pattern in phase 2 of Bebber et al. (2021), in which most of the participants in both conditions reduced smiling responses in this phase and increased funny reports in the jokes that were first presented with protocols (except in the Soccer joke). As suggested by the authors, the sequence and timing of the presentations of all jokes in phase 2 may have generated carry-over effects. This effect was considered in the Doctor joke of *Mix Control Desl*, in which most of the participants reported the joke as funny but reacted in another direction.

As in Experiment 1, participants in Experiment 2 were also re-exposed to the jokes without any protocol in all conditions. We first present the experimental design, followed by the results and discussion.

3.13. Experiment 2

As described in Experiment 1 – Phase 2, the participants in phase 2 were the same from phase 1, and the experimental context was also the same. Humor measured of recorded facial responses were also evaluated by the same IOB of phase 1, and self-reports about jokes was also replicated in this phase.

3.14.   Method

3.14.1. Experimental Design

Phase 2 of Experiment 2 involved the same four conditions (see Figure 7). All the conditions received the same jokes order in between activities, but without any protocol. Participants in the Control condition were re-exposed to the jokes in the same way. Participants in the Mix Control Desl, Disc Control Desl, and Id Control Desl conditions were exposed to the jokes without protocols. Thus, the Doctor and Beer jokes were now presented without Mix, Discomfort, and Identification protocols. Then, participants in Mix Control Desl received the Job joke as in phase 1, followed by the Soccer joke without the Desliteralization protocol. In the same direction but permuting the jokes, individuals in the Disc Control Desl and Id Control Desl conditions were re-exposed to the Soccer joke. Finally, they saw the Job joke without Desliteralization protocol for the first time.

3.14.2.   Procedure

3.14.3.   Experimental procedure

The procedure in phase 2 of Experiment 2 was almost the same as in phase 2 of Experiment 1, starting after a 10-minutes break from phase 1 and presenting all the jokes without the experimental protocols. In the four conditions, participants were exposed to the same four jokes without protocols and in the same order of phase 1 (i.e., Doctor, Beer, Job, and Soccer jokes in the *Control* and *Mix Control Desl* conditions and permuting the last two jokes in the *Disc Control Desl* and *Id Control Desl* conditions). As shown in Figure 12, all the jokes were re-exposed in the same way in the Control condition, while the Doctor and Beer jokes and the Soccer or Job jokes were presented without the experimental protocols in the other three conditions for the first time in phase 2. Finally, when all the jokes had been presented, a

message appeared on the computer screen indicating that the experiment was over, and participants were debriefed.
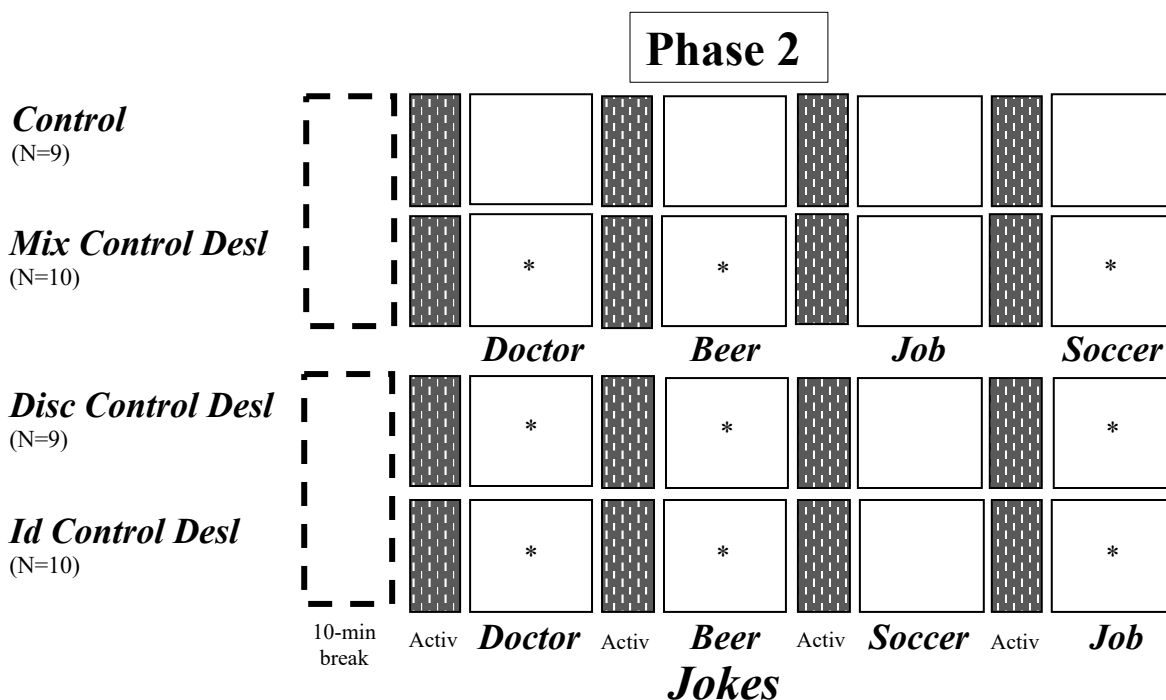
Figure 12. Experimental design of phase 2. Jokes are indicated at the bottom and were in the same order for both conditions. Control, and Mix Control Desl, Disc Control Desl, Id Control Desl refers to the named conditions. The white squares correspond to the jokes without any protocol. The Asterix correspond to the jokes that was received protocols in phase 1. The dark grey rectangle with white points indicates the activities in between jokes. Activ = in between activities; Desl= Desliteralization protocol; Disc= Discomfort protocol; ID= Identification protocol; and Mix= Mix protocol.

3.14.4. Data analysis

The same data analysis described for phase 2 of Experiment 2 were performed for phase 2 of Experiment 2.

3.15.   Results and Discussion

This section will first present the data on the inter-observer agreement for the presence of a smile during the experiment.

Then, we present data of facial responses and self-reports per condition, as well as the correspondence between both measures. The results are discussed according to the presence of humor responses in each joke.

3.15.1. Interobserver Agreement

The procedure analysis with the same trained observer was the same from phase 1.

As in phase 1 of Experiment 2, Ob1 was the only one that evaluated all the video-recorded faces. In contrast, Ob2 and Ob3 evaluated 15 and 17 different participants in a separate room over five days, respectively (the specific data regarding interobserver agreement is available upon request of the first author).

Table 14 indicates the kappa coefficient for each pair of observers. Kappa values ranged from 0.85 to 1 and 0.61 to 0.8, which shows an almost perfect and substantial agreement, respectively (Landis & Joch, 1977). Therefore, these results assure that face responses were adequately measured.

Table 14.

Kappa for interobserver agreement.

	Ob1 x Ob2	Ob1 x Ob3
Kappa values	0,78	0,92

3.15.2.   Effects of re-exposed jokes

Table 15 shows the same individual measures for each participant and per condition (i.e., facial responses, self-reports, and correspondence between) as Table 11, but from phase

2 of Experiment 2. Data from the *Control* and *Mix Control Desl* conditions are displayed in the upper and lower left panel, respectively. The *Disc Control Desl* and *Id Control Desl* conditions are in the upper and lower right panel, respectively. For each joke, Y or N indicates whether the participant smiled or not and considered the joke as funny or not. When in correspondence, Y/Y correspondence refers to participants who smiled and at the same time reported the joke as funny, whereas N/N correspondence indicates the participants who did not smile and at the same time reported other sensations.

The results from total correspondence (i.e., Y/Y and N/N responses) showed that *Control*, *Mix Control Desl*, and *Disc Control Desl* correspondence between facial responses and self-report was less than 70% in almost all the jokes. Specifically, only the Job and Doctor jokes of *Control* and *Disc Control Desl* presented correspondence higher than 70%, with 78% and 89% of the participants corresponding responses, respectively (see Total Corr at the bottom of each condition in Table 15). In contrast, the *Id Control Desl* condition showed a higher total correspondence in Beer (100%), Soccer (70%), and Job (90%) jokes, but with smaller correspondence in the Doctor joke (50%). Regarding the amount of total correspondence for each individual (see the rightmost column of each condition in Table 15), five participants in *Control* presented an amount of total correspondence less than three, with two of them (P25 and P27) presenting an amount of two correspondences, and the others (P22, P23, and P28) did only one time. In a similar pattern of *Control*, almost all the participants in *Mix Control Desl* did not corresponded to humor responses, with one (P32) and six (P30, P34 to P37, and P39) corresponding responses two times, respectively. In the *Disc Control Desl* condition, four participants presented an amount lesser than three; specifically, P42 and P48 presented two times, P47 only one time, and P43 did not showed any time. In contrast to the other three conditions, almost all the participants in *Id Control Desl* condition presented an amount higher/equal than three, whereas only two presented an amount of correspondence in two jokes

(P49 and P57). The analysis that follows is presented as phase 1, with the data from those participants who smiled and/or reported the joke as funny.

Table 15.
Facial responses and self-reports across all participants, jokes, and conditions of phase 2.

Condition		*Control*						*Mix Control Desl*				
	Partic	Doctor S/FR	Beer S/FR	Job S/FR	Soccer S/FR	#Corr	Partic	Doctor S/FR	Beer S/FR	Soccer S/FR	Job S/FR	#Corr
	P21	N/N	N/Y	N/N	N/N	3/4	P30	N/N	N/Y	N/Y	**Y/Y**	1/4
	P22	N/Y	Y/N	Y/N	N/N	1/4	P31	N/N	N/N	**Y/Y**	N/N	4/4
	P23	N/Y	Y/N	**Y/Y**	N/Y	1/4	P32	N/N	N/Y	**Y/Y**	N/Y	2/4
	P24	N/Y	N/N	N/N	Y/N	3/4	P33	N/Y	N/N	N/N	N/N	3/4
	P25	N/Y	Y/N	N/N	N/N	2/4	P34	N/N	N/Y	N/Y	N/Y	1/4
	P26	**Y/Y**	**Y/Y**	N/N	Y/N	3/4	P35	Y/N	**Y/Y**	N/Y	N/Y	1/4
	P27	N/Y	N/Y	N/N	N/N	2/4	P36	N/Y	**Y/Y**	N/Y	N/Y	1/4
	P28	N/Y	N/Y	N/Y	N/N	1/4	P37	N/N	N/Y	N/Y	**Y/Y**	1/4
	P29	N/N	N/N	N/N	N/N	4/4	P38	N/N	**Y/Y**	N/Y	N/N	3/4
							P39	N/Y	N/Y	**Y/Y**	N/Y	1/4
Total		2/6	5/5	5/7	1/5	25/40		0/1	5/3	2/7	5/8	22/35
% Total		20%/60%	50%/50%	50%/70%	10%/50%	63%		0%/11%	56%/33%	22%/78%	56%/89%	63%
Y/Y Corr (%)		20%	30%	50%	10%			0%	11%	22%	56%	
N/N Corr (%)		40%	30%	30%	50%			89%	22%	22%	0%	
Total Corr (%)		60%	60%	80%	60%			89%	33%	44%	56%	

Condition		*Disc Control Desl*						*Id Control Desl*				
	P40	N/N	N/N	N/Y	**Y/Y**	3/4	P49	N/N	**Y/Y**	N/Y	N/Y	2/4
	P41	N/N	**Y/Y**	**Y/Y**	**Y/Y**	4/4	P50	N/Y	**Y/Y**	**Y/Y**	**Y/Y**	3/4
	P42	N/N	Y/N	N/N		2/3	P51	Y/N	N/N	N/N	**Y/Y**	3/4
	P43	N/Y	N/N	N/Y	N/Y	0/4	P52	Y/N	N/N	N/N	N/N	3/4
	P44	N/N	Y/N	N/Y	N/Y	3/4	P53	N/N	N/N	N/N	**Y/Y**	4/4
	P45	N/N	Y/N	**Y/Y**	**Y/Y**	3/4	P54	N/Y	N/N	N/N	**Y/Y**	3/4
	P46	N/N	N/N	N/N	**Y/Y**	4/4	P55	N/Y	**Y/Y**	**Y/Y**	**Y/Y**	3/4
	P47	N/N	Y/N	N/Y	N/Y	1/4	P56	N/N	N/N	N/Y	**Y/Y**	3/4
	P48	N/N	N/Y	N/Y	**Y/Y**	2/4	P57	N/N	**Y/Y**	N/Y	**Y/Y**	2/4
							P58	**Y/Y**	**Y/Y**	**Y/Y**	**Y/Y**	3/4
Total		0/1	5/3	2/7	5/8	22/35		3/4	5/5	3/6	8/9	29/40
% Total		0%/11%	56%/33%	22%/78%	63%/100%	63%		30%/40%	50%/50%	30%/60%	80%/90%	73%
Y/Y Corr (%)		0%	11%	22%	63%			10%	50%	30%	80%	
N/N Corr (%)		89%	22%	22%	0%			40%	50%	40%	22/35	
Total Corr (%)		89%	33%	44%	56%			50%	100%	70%	63%	

Notes: #Corr= number of correspondence; FR= funny report; N= No; Part= participants; S= smile; Y= yes. Blue, gray, green and red background indicates manipulated jokes.

Figure 13 presents, for each joke, the percentage of participants smiling, reporting the joke as funny, and showing Y/Y correspondence between both responses in the four conditions responses (upper and bottom in the left graphs refer to *Control* and *Mix Control Desl*, respectively). Specifically, one participant (11%) and seven (78%) reported the re-exposed Doctor joke as funny in the *Control* condition; the participant who smiled also reported the joke as funny. Following this joke, four participants (44%) smiled and reported the Beer joke as funny, only one of them corresponded with Y/Y responses. Then, when the Job joke was exposed for the second time, two participants (22%) smiled and reported it as funny, with one of them (11%) presenting Y/Y correspondence. Finally, when the Soccer joke was presented, two individuals (22%) and one (11%) reported the joke as funny, with the absence of Y/Y responses between them.

Concerning *Mix Control Desl*, data of humor responses were not statistically significant compared to *Control* (except when indicated). When the Doctor joke was exposed without Mix protocol, one and three individuals (10% and 30%) presented smiling and reported the joke as funny (Y/Y correspondence was absent). When the following Beer joke was also presented without Mix protocol, three and eight participants (30% and 80%) smiled and reported the joke as funny; all the participants who smiled also reported the joke as funny (30%). In the re-exposed Job joke, three participants (30%) showed Y/Y responses, and the other six only reported the joke as funny (the total funny report was 90%; with difference between conditions, $p=.02$). Finally, when the Soccer joke was presented without the Desliteralization protocol, two participants (20%) smiled and corresponded with the funny report, and the other five only reported the joke as funny (70% reported funny; significance between conditions were found, $p=.005$).

These results from phase 2 reveal a similar pattern to Experiment 1, in which most of the participants did not smile at the jokes in *Control and Mix Control Desl* conditions but reported the joke as funny. This pattern occurred mainly in the first two jokes of the *Control* condition, although there were fewer of them compared to when the jokes were first introduced. In the *Mix Control Desl*, where three of the four jokes (i.e., the Doctor, Beer, and Soccer jokes) were presented without any protocol for the first time, most of the participants considered the jokes funny, except the Doctor joke.

Regarding *Disc Control Desl* condition (see upper-right graph in Figure 13), data were as follows (there was significant difference with *Control* condition in only one measure, as it is following indicate). In the Doctor joke presented without Discomfort protocol, the presence of humor responses occurred in only one participant (11%) that reported the joke as funny (the difference was significant compared to *Control* condition, $p=.04$). When the Beer joke was presented without the Discomfort protocol, five and three participants (56% and 33%) smiled

and reported the joke as funny, but only one (11%) showed Y/Y correspondence. In the re-exposed Soccer joke, two participants (22%) smiled at the joke, and seven (78%) reported in the same direction (Y/Y responses occurred in the two participants who smiled). Finally, humor responses increased when the Job joke was presented without the Desliteralization protocol. Five participants (63%) presented Y/Y responses, and the other three only reported the joke as funny (i.e., all the participants reported the joke as funny, 100%).

A similar pattern occurred in *Id Control Desl* (see bottom right graph in Figure 13), and no differences were found between the first two jokes of Id Control Desl and Control conditions and the last two jokes of *Id Control Desl* and *Disc Control Desl*. When the Doctor joke was exposed without Identification protocol, three and four participants (30% and 40%) smiled and reported the joke as funny; the presence of the Y/Y response occurred in only one participant (10%). Five participants (50%) smiled at the Beer joke and reported it funny when the Identification protocol did not precede the joke. In the re-exposed Soccer joke, three and six participants (30% and 60%) smiled and reported the joke as funny, respectively (Y/Y responses occurred in all the participants who smiled; 30%). Finally, in the not desliteralized Job joke, eight and nine participants (80% and 90%) smiled and reported the joke as funny; the participants who smiled also reported in the same direction (80%).

Data obtained in the *Disc Control Desl* and *Id Control Desl* conditions showed a similar pattern. Participants presented slightly fewer smiles and funny reports at the first three jokes, except in the re-exposed Doctor joke without the Discomfort protocol (absence of humor response occurred in almost all the participants). Interestingly, when the last joke (i.e., Job joke) was presented without the Desliteralization protocol, both conditions showed many smiling responses and reported funny. These results differ from smiling responses in the Doctor and Soccer jokes, where participants smiled to a lesser degree when they were first presented with the Desliteralization protocol in the Mix Control Desl conditions.
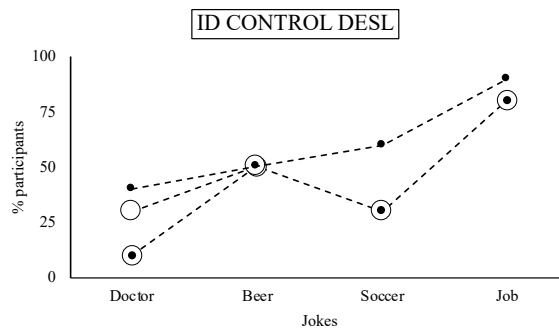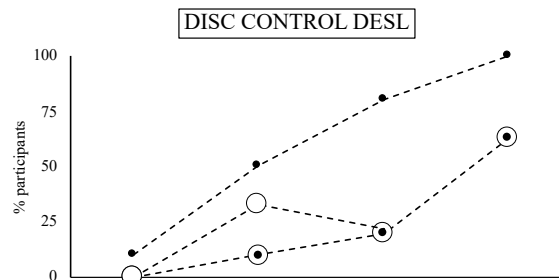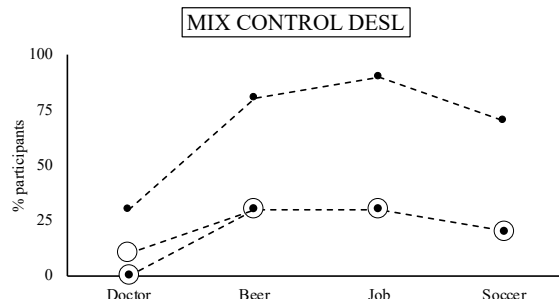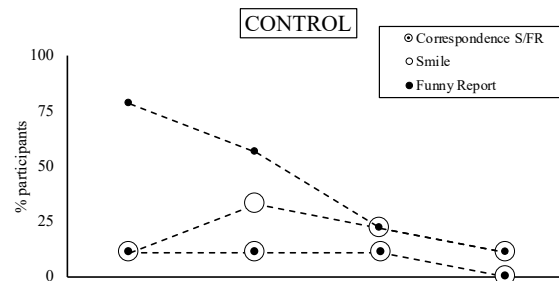
Figure 13. Percentage of smiling, funny report, and the correspondence of smiling and funny report of phase 2 are indicated in the upper two graphs of Control and Mix Control Desl conditions, respectively. In the lower two graphs indicates the percentage of humor measures of Disc Control Desl and Id Control Desl conditions, respectively.

In summary, when participants were re- exposed to the same jokes without any protocol (including those that were presented between the experimental protocols) they showed slightly decreased humor responses. These results are in line with Bebber et al. (2021) and with the findings from Experiment 1 of the present study, where the findings showed that being re-exposed to the jokes impacted the participants' smile responses. In the same line, when thee jokes did not precede the mixed and separated elements of the three different protocols, smiling responses occurred in a small number of participants. These findings are consistent with Bebber et al. (2021) and might be analyzed considering the relatively short interval between two exposures jokes. Finally, in the last jokes (i.e., Soccer and Job jokes), without the added functions of Desliteralization protocol, an increase of humor responses occurred in both jokes, mainly in the re-exposed Job joke in Disc Control Desl and Id Control Desl. In contrast, the re-exposed Soccer joke presented a higher presence of funny reports, which was consistent with the Doctor joke of Experiment 1.

3.16.   General Discussion

Phase 2 aimed to explore the effects of presenting the jokes for a second time in the derivation of humor, either jokes that were first presented without any protocol in phase 1, and those that were presented with experimental protocols. For this, the same four jokes were presented with in between activities, and thus all the jokes were identical across the different conditions and phases, differing only in the experimental history. That is, whether the joke

was presented with or without protocol in phase 1, and the order in which they were

presented.

Data about facial expressions and self-reports could be summarized as follows.

Firstly, when participants were exposed with the jokes without any protocol for the second

time, the smile responses and funny reports decreased in relation to phase 1. The

correspondence between them also decreased. These results occurred for all jokes and might

be analyzed considering the relatively short interval between the two exposures to the joke.

Secondly, data from the first two jokes preceded by the experimental protocols (i.e.,

the Soccer and Job jokes in Experiment 1, and the Doctor and Beer jokes in Experiment 2)

showed that the smile responses also decreased compared to when the jokes were presented

without any protocol in phase 1 (except in the Beer joke of *Mix Control Desl*), with no

significant differences between the conditions with the same jokes order. In contrast, the

percentage of participants who reported the jokes as funny at phase 2 was more varied,

increasing in four of the eight jokes, decreasing in three of them (there was significant

difference only in the Doctor joke in *Disc Control Desl*), and remaining identical in one joke.

Interestingly, this increase of funny reports occurred mainly in those participants that were

first presented with Mix protocols (just the Soccer joke was identical to phase 1), while only

the Beer joke of *Id Control Desl* increased the funny reports. Consequently, with smiles and

funny report pointing to different directions, the total correspondence between measures

decreased for phase 2.

Thirdly, when the last jokes (i.e., the Doctor joke in Experiment 1, the Soccer joke in

Control and *Mix Cont Desl* condition of Experiment 2, and the Job joke of *Disc Cont Desl*

and *Id Cont Desl* conditions of Experiment 2) were presented without the added functions of

the Desliteralization protocol, smiles and funny reports increased for all of them during phase

2. Specifically, the Doctor and Soccer jokes in *Mix Control Desl* slightly raised smile

responses, but a considerable number of participants reported the joke as funny (significant differences with the *Control* condition were found for the *Soccer* joke). Also, the Job joke in both *Disc Control Desl* and *Id Control Desl* produced a higher number smile responses and participants reported the jokes as funny, with both humor measures running in parallel.

The results from phase 2 indicate that when the participants were re-exposed to the jokes for the second time, it impacted in the smile responses (except in the Job joke that was paired with the Desliteralization protocol in phase 1), which is consistent to the previous study (Bebber et al., 2021), and with studies that analyze the repetition of the same joke to individuals (Gavanski, 1986). These findings should be analyzed considering that most of the participants did not smile in *Control* conditions in Phase 2, as well the relatively short interval between the two exposures to the joke.

As previously stated, this part of the study explored the derivation of humor functions when the jokes were exposed for the second time. Large variability prevents establishing a firm conclusion about the results of phase 2. Curiously, only the Job joke, that was previously presented in the first phase with the Desliteralization protocol, demonstrated to increase smiling responses. This pattern was not found with the Doctor and Soccer jokes that were presented with the same protocol in phase 1 but in a different sequence. Although this was not one of the objectives of the study, perhaps the complexity of the Job joke network compared to the Doctor and Soccer jokes networks facilitated the emergence of humorous responses in the experimental sequence. It is likely that a lesser complexity may have facilitated the emergence of humor when the joke is presented after a longer period of exposure to other stimuli. Future studies should consider the sequence in which the joke is presented and the experimental sequence in which the jokes are exposed.

The goal of the Desliteralization protocol was to avoid the carry-over effect that happened in the previous study (Bebber et al., 2021) by not allowing the complete but

incoherent coherent network to build with the added relational features of the joke. As presented, the results showed that almost no participants laughed at the Doctor, Soccer, and Job jokes when exposed to these desliteralization conditions in phase 1. When in phase 2 the jokes were presented again   results for the Doctor and Soccer jokes corroborate the previous findings from these conditions, as fewer participants smiled but with a greater number reporting that the jokes were funny. In contrast, when the Job joke was presented a second time in the same conditions, most subjects smiled and responded the joke as funny in both conditions (*Disc Control Desl* and *Id Control Desl*).

Since this is an exploratory study, new questions arise when analyzing the results of the phase 2 Job joke. For example, is there a difference between the jokes and the order in which they are presented? If so, where do these differecnces between each joke do come from? Future studies can focus their analysis on these questions for a better understanding of the emergence of humor. From a relational point of view, it seems that the lower network complexity of the Job joke facilitated the emergence of humorous functions even though it was presented in last place during the experimental sequence. Specifically, because this joke involves mainly mutual coordination relations (e.g., "juguete" is "toy" in English, "toy" is a pun intended of the verb to be in Spanish) and, therefore, involves less complex relations compared to the Doctor and Soccer jokes (see Appendix X for the relations of each joke). Thus, less complexity in the joke after a long period of exposure to different contexts does not seem to be a conflicting factor with the carry-over effect. Also, the data need to be looked at carefully, as there is no specific control condition that compares for the Job joke being presented twice as a joke after the sequence of different stimuli, as well as the absence of a measure to compare whether a joke was less complex than the others.

To sum up, findings from this phase 2 adds further empirical evidence of replication of jokes after being exposed with and without experimental protocols. The results indicate

that being exposed for the second time to the jokes, in both Experiment 1 and 2, that were

first present with or without protocol impacted in smiling responses. Since the jokes in the

control condition reduced humor responses, it is not possible to draw further conclusions

from this second phase in the experimental design that was used. However, the findings of

the Job joke in *Disc Control Desl* and *Id Control Desl* in Experiment 2 might be considered

in the designed study, and further research might focus on clarifying whether the complexity

of joke network should prevent or promote the emergence of humor behavior depending on

the context in which is presented.

CHAPTER 4: CONCLUSITION

The experimental analysis of the current and historical conditions under which humor responses occurs has been very scarce in the behavioral literature, and thus the exploration of these conditions was the main objective of this dissertation. Based on this goal, this dissertation began with a conceptualization of humor behavior and an empirical review. The impact of three protocols on humor responses was analyzed according to the relational framings involved (Study 1), which allowed us to advance in identifying the conditions that alter the humor response (Study 2).

4.1. Contributions

In this section a relational frame interpretation of humor as relational, verbal behavior will be presented. Then, the contributions concerning the implications of the conditions in interaction with individuals' personal history under which humor behavior occurs or not, will be discussed.

4.1.1. Humor Behavior

The empirical review performed in Chapter 1 showed the scarcity of experimental analysis studies about the conditions under which humor responses emerge. Most studies on humor devoted considerable attention to testing the conditions of humor conceptualization by refining the levels of cognitive-perceptual conditions (Martin & Ford, 2018). Despite the advances in humor research and theories, there are no experimental studies on the individual history level and responding to the question "why a person laughs at a joke" remains unanswered. An approximation of humor based on the RFT framework can contribute to address this question.

According to RFT, "most jokes create relational networks that are complete, meaningful, and coherent but incongruous" (Stewart, Barnes-Holmes, Hayes, & Lipkens, 2001, p. 83). Furthermore, it is argued that there would be no humor if the features of relational framing did not lead to a specific derived relation (Hayes & Hayes, 1989). The derived relational responses are the core for the new relations that emerge to oneself and how one interacts with one's thoughts, emotions, and memories that get updated depending on the context. For RFT, the individual thoughts and emotions are self-content or self-rules. Throughout the development of the verbal community, people have learned to understand, create, and follow these rules when they become fluent in framing. Self-rules will vary across cultural contingencies, depending on the context of each individual, the way their behavior has been treated, and how they have learned to derive (Luciano, 2017). Rule-governed behavior, or verbal regulation, is the reaction to one's behavior (i.e., the rules derived or provided by others acquire a function) which works as a functional stimulus that specifies antecedents, actions, and consequences (i.e., Skinner, 1969; Zettle & Hayes, 1982). Thus, the rule is an individual product that emerges from multiple interactions with the verbal community and from the natural contingencies that an individual encounter during their development. Thus, the joke's content emerges in an individual as a function of the dominant self-rules, and depending on the content of the joke, this content embedded in a specific context might be transformed to coherent, meaningful, and complete according to the dominant self-rule, but incongruent.

Study 1 aimed to analyze the impact of three elements that might prevent the humor function of a joke to emerge. For this purpose, three experimental protocols were developed to explore the conditions that might alter humor emergence: Reality (by inviting the participant as if being in the situation described in the joke), Identification (by inviting the participant to take the perspective of the characters in the joke), and Discomfort (describing the Discomfort of the characters in the joke). Their effects on humor were measured using facial responses as

the primary indicator and self-reports as a secondary measure. The results showed a reduction of humor responses when the Reality and the Discomfort protocols were implemented, and to a lesser degree with the Identification protocol, which in turn might be useful to answer our original question of why a joke produces humor for a person. This study tested the three protocols in one Experimental condition and indicated the importance of the functional deictic framing I-Here-Now and discomfort functions.

Study 2 involved two further experiments aimed to explicitly include all the relational functions that might affect the emergence of humor behavior (i.e., perspective taking and discomfort functions). It focused on the functional role of deictic framing with discomfort functions as psychological processes involved in changing the functions of relational networks involved in jokes. Experiment 1 included two protocols for each of two conditions (i.e., *Control* conditions without any protocol, and *Mix Cont Desl* condition with two protocols for three jokes). Specifically, two jokes were preceded by (1) one protocol that invited the participant to take the perspective of the joke characters that feel Discomfort in the situation of two jokes; and one joke (2) included adding words, letters, and colors, as well as altering the timing and order of sentences. Experiment 2 stemmed from the first, including and using the same protocols for different jokes and adding two protocols (i.e., the *Control* and *Mix Cont Desl* conditions were replicated, and *Disc Cont Desl* and *Id Cont Desl* conditions were included) that consisted of (3) inviting the participant to take the perspective of the characters in two jokes; (4) and describing a situation in two jokes that the joke characters feel Discomfort. The results indicated a similar pattern between Experiment 1 and 2 regarding the Control conditions and the conditions with Mix and Desliteralization protocols, in which participants in the Control condition showed a higher percentage of smiling and reporting the jokes as funny than participants exposed to the condition with experimental protocols (i.e., Mix and Desliteralization protocols). These protocols reduced the smiling responses and reporting the

jokes as funny in almost all the participants exposed to them. Data from the Discomfort and Identification protocols revealed that the smiling and reporting of the jokes as funny of the participants was lesser than the same jokes in the Control condition. In conclusion, thus study adds empirical evidence of the impact of deictics I-Here-Now with discomfort functions in altering the humor derivation. The results showed that mainly two protocols were effective: (1) the so-called Mix protocol established a context to the four jokes by framing the deictic of I-Here-Now with discomfort functions; and (2) the Desliteralization protocol added new functions in the joke network.

In both studies 1 and 2, participants were re-exposed the jokes after a 10-minutes break. In both cases, participants across conditions were exposed to the same four jokes without protocols and in the same order of the previous exposure. The results showed that when the jokes were presented for the second time in this phase 2, participants in all conditions reduced smiling responses but responded to the jokes as funny, with no significant differences between conditions. Curiously, only the Job joke of Study 2, which was previously presented in the first phase with the Desliteralization protocol, demonstrated to increase smiling responses. To sum up, since the jokes in the control condition reduced humor responses, it is not possible to draw further conclusions from this second phase in the experimental design that was used.

In conclusion, these two studies showed the role of perspective-taking and discomfort functions in disrupting the humor responses. This dissertation is the first experimental approach to analyze the impact of those functions in humor behavior.

4.2. Exploring the conditions to alter the humor behavior

In Studies 1 and 2, five experimental protocols were applied to alter the humor emergence. The analysis of the protocols in all the jokes requires mentioning that the impact of the protocols was not equal for all the participants, which indicates that the relevant variable

it is not the protocol *per se* but the function that the protocol generated in interaction with the personal history of the individual. In both studies, we did not measure or manipulate the participants' personal history; possibly, part of this between subjects variability is related to those repertoires involved in understanding the protocol in interaction with the joke. In addition, there may be intrasubject variability, in which the individual laughs at one joke but not at another. This type of variability could be related to how the function of each joke interacts with a personal repertoire that would be valid for one joke and not for another (since it is the same individual).

Despite these two sources of variability, an analysis of the protocols themselves and on how they impacted humor responses can be performed, at least tentatively.

Study 1 developed three protocols – Reality, Identification, and Discomfort – with different elements. In the Reality protocol, the participant was asked to imagine that the things being told were really occurring; that is, the protocol establishes the framing of the events There in the context of I (the participant)-Now-There. In the Identification protocol, the participants were asked to imagine being one of the characters explicitly. Finally, the Discomfort protocol was focused on coordinating the characters' behaviors with aversive functions. The results showed a reduction of humor responses when the Reality and the Discomfort protocols were implemented, and to a lesser degree with the Identification protocol. It seems that despite the different elements of each protocol, they generated a similar psychological process in the participants. That is, at the very end –and as could not be in any other way- the protocols interacted with the specific ideographic relational history. Therefore, the protocols derived functional relation in the participants, either by deriving an aversive function in the Reality protocol or by changing his/her perspective from You-There to I-There-Now so that the functions given to the characters be transferred to him/herself in the Discomfort protocol. In the Identification protocol, the participants were asked to explicitly imagine to be one of the

characters, and the joke was presented in a format (e.g., the word *Mahou* was written in a fond letter different to the rest of the words, and all the dialogue was presented in speech bubbles) that might have precluded the intended aim of the protocol. Perhaps, the participant's perspective-taking history might not be strong enough or, perhaps, the functions given to the content of the protocol, as well as the participant's functions the content of the joke, were not adequate for humor to emerge.

Study 2 aimed at explicitly including all the relational functions that might affect the emergence of humor behavior. The protocols developed were focused on the functional role of deictic framing with discomfort functions as psychological processes involved in changing the functions of the jokes' relational networks. The Mix protocol included perspective frames of I-Here-Now with functions of discomfort. We isolated the two elements of the Mix protocols and generate two different protocols: the Discomfort and Identification protocols. Finally, the Desliteralization protocol included new functions to the joke network (e.g., adding letters, repeating words, altering time). The findings of the Mix and Desliteralization protocols revealed a high impact in the alteration of humor responses in the participants. By contrast, the Identification and Discomfort protocols decreased the participants' humor responses, but to a lesser degree.

It appears that introducing the Mix protocol before the jokes, in which the listener is in the "skin" of the joke character, occurring now, and incorporating that this character is having a bad moment, was sufficiently dominant to influence people with different personal histories, impacting in the smile responses and funny reports of the participants in all the jokes. In this protocol, we could not isolate which of the two functions has a more profound impact on the joke network, and then determine which of the two generated the transform the functions of the joke. When both elements were separated in the Discomfort protocol, we only placed the character in a negative situation (i.e., a motivational state of Other-There-Then with discomfort

functions), and most participants also smiled at the jokes. This suggests that participants needed a Here-Now perspective cue with the joke character to alter the humor responses effectively. Looking at the Identification protocol, framing the joke as if the listener is in the "skin" of the character, that is as if occurring with ME, but without incorporating any functions, most participants smiled at the jokes. This result suggests (1) that participants were not fluent enough in the PT of the other, or (2) if they were fluent enough, at least aversive functions might be needed to alter the derivation of humor. Lastly, the inclusion of new functions was coherent with previous studies where the Desliteralization protocols have shown to alter the aversive functions of words (Masuda et al., 2004; Valdivia et al., 2006; Masuda et al., 2008; Masuda et al., 2010), which also points to an alteration of functions, but in this case humor functions. Possibly, the deliteralization is altering the perspective, which in turn does not allow for the emergence of the intended functions of the joke.

To sum up, the complexity of functional relations in a joke is huge. In this study, just two functions were manipulated, the perspective and the motivational state of discomfort in the joke. Producing a change in the function of the joke's context, either by including deictic and uncomfortable functions or by adding functions to the networks, changed the joke's content. If we include the perspective with discomfort functions, the joke stops being funny. When we deliteralized the network of the joke, the appetitive functions were not activated and, therefore, there was no joke.

The results of Study 2 are in line with Study 1, but Study 2 was more accurate concerning the elements that alter the humor emergence. These elements of I-Here-Now with discomfort functions before the jokes seem to bring a "context of reality" to the joke, in which the participants behave as if it was something real, that is occurring now, and have no perspective about the joke and respond to it by not smiling. In other words, these verbal relations introduced by the Mix protocols before the jokes become a contextual control to

respond to a serious situation, which prevents the emergence of the humorous functions of the joke when I-Here-Now with a motivational state of seriousness (i.e., a real situation). As it is the first time that both elements are mixed in one protocol, it is worth mentioning that the first name used for the protocol, the Reality protocol, should be more appropriate.

In conclusion, this second study adds empirical evidence of the impact of deictics I-Here-Now with discomfort functions in altering the humor derivation. The results showed that mainly two protocols were effective: (1) the so-called Mix protocol established a context to the four jokes by framing the deictic of I-Here-Now with discomfort functions; and (2) the Desliteralization protocol added new functions in the joke network.

4.3. Methodological strengths of the studies

Humor responses were registered through two measures in both studies, the participant's smiles when the jokes were presented and, some seconds later, the self-report about the feeling in the previous experience. As indicated in the introduction, most of the studies relied on self-reports while measuring the changes in facial expression is advocated to avoid the limitations associated with the use of self-reports (Cabello & O'Hora, 2002, 2016; Critchfield, Tucker, & Vuchinich, 1998; Perone, 1988; Shimoff, 1986).

Study 2 added greater experimental control than Study 1, and some aspects are worth mentioning for the humor derivation analysis. Firstly, we implemented two control conditions for the four experimental conditions, which allowed for the comparison of the Mix protocol's effects across all jokes. Moreover, the four conditions of Experiment 2 in Study 2 enabled the analysis of the differential impact of the Mix, Discomfort, and Identification protocols in the same two jokes. Secondly, the Mix, Discomfort, and Identification protocols were addressed in different conditions, while in the previous study, all the three protocols – Reality, Identification, and Discomfort - were applied in the same condition. Finally, a new protocol

was added to the last joke in order to avoid the carry-over effect in the response of the participants (i.e., the Desliteralization protocol).

4.4. Limitations

Limitations of the two studies reported here are worth mentioning. Probably, the most relevant is that each protocol's effect was restricted to a particular context (that is, a particular joke), and that the sequence and timing of the presentations of all the jokes to the same participant might have generated carry-over effects in Study 1. Similarly, this process might also happened in Study 2, when the fourth joke was presented in the Control condition.

Another limitation is that both Studies did not measure the fluency in perspective taking of participant's personal history. This measure would allow a more precise analysis regarding the personal history of each individual for the emergence of humor.

Moreover, the measures of pre-experimental questionnaires showed that the participants did not differ concerning to the measured repertoires across conditions. However, these measures did not constitute good metrics of self-rules about the personal history of the individual in interaction with the components of the jokes or about the flexibility in relating and transforming functions; for example, for one perspective to another in agent (I-You), place (Here-There), and time (Now-Then).

4.5. So, why a joke is funny?

When a joke generates humorous responses, it seems that the subject has to take some perspective on the story's context. Possibly, the functions of the conventional network, reinforced via community, are not activated because of the perspective-taking of such network. For instance, the patient would die if the surgery really occurred in such situation. On the other hand, perhaps we can literalize the functions, but with some perspective of the situation. That

is, we are not analyzing when the humor response is altered but when it is produced (for a review in humor production, Ruch, & Heintz, 2019). Hence, for a joke to be funny, people must have a repertoire of taking perspectives from distinct or opposite networks that collapse into one.

4.6. Proposal for future studies

Some questions emerged when analyzing the role of perspective-taking and discomfort functions. Regarding the Doctor joke, what would happen if we moved the perspective to the surgeon instead of the patient's perspective? In the case of the Beer jokes, what would happen if, instead of the anger of the person with his job colleague, we take the perspective of another person with appetitive functions out of the situation? Considering that we invited the participants to take the perspective of themselves in the patient's or the job colleague's "skin" because there is less complexity in perspective taking (see Barbero-Rubio et al., 2016), what if we had introduced a loved one as a patient and we look at this loved person in this situation? Or someone we did not know? Or, why not, someone we do not like, would we laugh? Future studies may move towards answering these questions.

Adding functions to a joke opens the doors for further research on humor. Let us imagine that you told a joke and this thought emerge, "why did I laugh when *Eugenio* told a joke, but my friend didn't when you told him the same joke?" That is, the functions under which my friend listened to the joke that you told him; that is, the time, the posture, the voice tone. All the functions that Eugenio bring when telling a joke, and all the functions that *you* as a joke teller, are not the same, which might be crucial to humor derivation. Future research should isolate those functions to analyze the impact on the joke network. For example, if the functions of a joke teller (appetitive or aversive) may have impact or not in the humor responses.

4.7.Concluding remark

In conclusion, the current dissertation is the first to analyze the elements that impact the humor emergence. The present dissertation emphasizes and contributes to understand the role of deictics I-Here-Now with discomfort functions in altering the humor derivation. Also, it lends empirical support for the RFT analysis of humor in particular, and of human language and cognition in general.

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APPENDICES

A. CONSENT FORM

A.1 JOKES IDENTIFICATION

ANÁLISIS EXPERIMENTAL Y APLICADO DEL COMPORTAMIENTO

Grupo de investigación HUM-595 (Universidad de Almería, España)

D./Dña. _____, con DNI _____, edad_____, estudiante de_____, año de curso_____, acepta las condiciones para mi participación en el proyecto de investigación relativo a "Analizar cómo la gente identifica diferentes situaciones". Este estudio está bajo la dirección de la Dra. Carmen Luciano, Catedrática de Psicología en la Universidad de Almería.

Las condiciones de mi participación me han sido informadas y queda dispuesto que los datos obtenidos seguirán la normativa del código deontológico en el ámbito de intervención psicológica y en el marco de investigación de modo tal que todos los datos obtenidos recibirán un trato colectivo y anónimo.

Almería, __, _____ de ____

_____   _____
Firma del participante   Firma del investigador

UNIVERSIDAD DE ALMERÍA

A.2 STUDY 1 AND 2

UNIVERSIDAD DE ALMERÍA
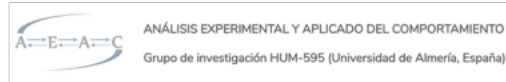
ANÁLISIS EXPERIMENTAL Y APLICADO DEL COMPORTAMIENTO
Grupo de investigación HUM-595 (Universidad de Almería, España)

D./Dña. _____, con DNI _____, mayor de edad, acepta las condiciones para mi participación en el proyecto de investigación relativo a "Analizar como respondemos en diferentes situaciones" bajo la dirección de la Dra. Carmen Luciano, Catedrática de Psicología en la Universidad de Almería.

- El procedimiento implica responder a lo que está en el ordenador y tendrá una duración aproximada de 60 minutos.
- Podrá abandonar la investigación en el momento que considere conveniente.
- Todo lo que ocurra en el experimento es **ANÓNIMO** y nunca estará vinculado a tu nombre.

La información me ha sido dada de forma comprensible y mis preguntas han sido contestadas, por lo que me comprometo a participar.

Las condiciones de mi participación me han sido informadas y queda dispuesto que los datos obtenidos seguirán la normativa del código deontológico en el ámbito de intervención psicológica y en el marco de investigación de modo tal que todos los datos obtenidos recibirán un trato colectivo y anónimo.3

Del mismo modo, los encargados del estudio, nos hacemos responsables del cuidado de los participantes y garantizamos que las condiciones experimentales y las medidas de seguridad son similares a las adoptadas en otros experimentos en los que los sujetos no han sufrido ningún tipo de riesgo, ni psicológico, ni físico, ni de ninguna otra naturaleza.

Almería, __ , _____ de ____

_____   _____
  Firma del participante   Firma del investigador

A.3 INTEROBSERVER CONSENT FORM
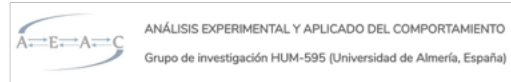
D./Dña. _____, con DNI _____, mayor de edad, acepta las condiciones para mi participación en el proyecto de investigación relativo a "Analizar como respondemos en diferentes situaciones" bajo la dirección de la Dra. Carmen Luciano, Catedrática de Psicología en la Universidad de Almería.

- El procedimiento implica evaluar a la cara de los sujetos de acuerdo con el entrenamiento.
- Podrá abandonar la investigación en el momento que considere conveniente.
- Todo lo que ocurra en el experimento es **ANÓNIMO** y nunca estará vinculado a tu nombre, así como la de los participantes.

La información me ha sido dada de forma comprensible y mis preguntas han sido contestadas, por lo que me comprometo a participar.

Las condiciones de mi participación me han sido informadas y queda dispuesto que los datos obtenidos seguirán la normativa del código deontológico en el ámbito de intervención psicológica y en el marco de investigación de modo tal que todos los datos obtenidos recibirán un trato colectivo y anónimo.

Del mismo modo, los encargados del estudio, nos hacemos responsables del cuidado de los participantes y garantizamos que las condiciones experimentales.

Almería, __, _____ de ____

_____   _____
Firma del evaluador   Firma del investigador

B QUESTIONNAIRES

B.1 SURVEY

En cada una de las imágenes que veas, indica con una "X" que es para ti:

"Esto es un(a)_____"

	Noticia	Chiste	Anuncio	Otro		Grado
1)	Noticia	Chiste	Anuncio			
2)	Noticia	Chiste	Anuncio			
3)	Noticia	Chiste	Anuncio			
4)	Noticia	Chiste	Anuncio			
5)	Noticia	Chiste	Anuncio			
6)	Noticia	Chiste	Anuncio			
7)	Noticia	Chiste	Anuncio			
8)	Noticia	Chiste	Anuncio			
9)	Noticia	Chiste	Anuncio			
10)	Noticia	Chiste	Anuncio			
11)	Noticia	Chiste	Anuncio			
12)	Noticia	Chiste	Anuncio			
13)	Noticia	Chiste	Anuncio			
14)	Noticia	Chiste	Anuncio			
15)	Noticia	Chiste	Anuncio			

B.2 AAQ-II

AAQ-II

Debajo encontrará una lista de afirmaciones. Por favor, puntúe en qué grado cada afirmación ES VERDAD PARA USTED haciendo un círculo en los números de al lado. Use la siguiente

1	2	3	4	5	6	7
NUNCA ES VERDAD	MUY RARAMENTE ES VERDAD	RARAMENTE ES VERDAD	A VECES ES VERDAD	FRECUENTEMENTE ES VERDAD	CASI SIEMPRE ES VERDAD	SIEMPRE ES VERDAD

escala para hacer su elección.

1.Mis experiencias y recuerdos dolorosos hacen que me sea difícil vivir la vida que querría	1	2	3	4	5	6	7
2. Tengo miedo de mis sentimientos.	1	2	3	4	5	6	7
3. Me preocupa no ser capaz de controlar mis preocupaciones y sentimientos.	1	2	3	4	5	6	7
4. Mis recuerdos dolorosos me impiden llevar una vida plena.	1	2	3	4	5	6	7
5. Mis emociones interfieren en cómo me gustaría que fuera mi vida.	1	2	3	4	5	6	7
6. Parece que la mayoría de la gente lleva su vida mejor que yo.	1	2	3	4	5	6	7
7. Mis preocupaciones interfieren en el camino de lo que quiero conseguir.	1	2	3	4	5	6	7

B.3 IRI (PT)

Apellidos y Nombre .... Edad
.... Curso .... Sexo: V M

Las siguientes frases se refieren a vuestros pensamientos y sentimientos en una variedad de situaciones. Para cada cuestión indica cómo te describe **eligiendo la puntuación de 1 a 5 (1= no me describe bien; 2= me describe un poco; 3= me describe bien; 4= me describe bastante bien y 5= me describe muy bien)**. Cuando hayas elegido tu respuesta, marca con una cruz la casilla correspondiente. **Lee cada frase cuidadosamente antes de responder.** Contesta honestamente. GRACIAS.

	1	2	3	4	5
1. Sueño y fantaseo, bastante a menudo, acerca de las cosas que me podrían suceder					
2. A menudo tengo sentimientos tiernos y de preocupación hacia la gente menos afortunada que yo					
3. A menudo encuentro difícil ver las cosas desde el punto de vista de otra persona					
4. A veces no me siento muy preocupado por otras personas cuando tienen problemas					
5. Verdaderamente me identifico con los sentimientos de los personajes de una novela					
6. En situaciones de emergencia me siento aprensivo e incómodo					
7. Soy normalmente objetivo cuando veo una película u obra de teatro y no me involucro completamente					
8. Intento tener en cuenta cada una de las partes (opiniones) en un conflicto antes de tomar una decisión					
9. Cuando veo que a alguien se le toma el pelo tiendo a protegerlo					
10. Normalmente siento desesperanza cuando estoy en medio de una situación muy emotiva					
11.A menudo intento comprender mejor a mis amigos imaginándome cómo ven ellos las cosas (poniéndome en su lugar)					
12. Resulta raro para mí implicarme completamente en un buen libro o película					
13. Cuando veo a alguien herido tiendo a permanecer calmado					
14. Las desgracias de otros normalmente no me molestan mucho					
15. Si estoy seguro que tengo la razón en algo no pierdo tiempo escuchando los argumentos de los demás					
16. Después de ver una obra de teatro o cine me he sentido como si fuera uno de los personajes					
17. Cuando estoy en una situación emocionalmente tensa me asusto					
18. Cuando veo a alguien que está siendo tratado injustamente a veces no siento ninguna compasión por él					
19. Normalmente soy bastante eficaz al ocuparme de emergencias					
20. A menudo estoy bastante afectado emocionalmente por cosas que veo que ocurren					
21. Pienso que hay dos partes para cada cuestión e intento tener en cuenta ambas partes					
22. Me describiría como una persona bastante sensible					
23. Cuando veo una buena película puedo muy fácilmente situarme en el lugar del protagonista					
24. Tiendo a perder el control durante las emergencias					
25. Cuando estoy disgustado con alguien normalmente intento ponerme en su lugar por un momento					
26. Cuando estoy leyendo una historia interesante o una novela imagino cómo me sentiría si los acontecimientos de la historia me sucedieran a mí					
27. Cuando veo a alguien que necesita urgentemente ayuda en una emergencia me derrumbo					
28. Antes de criticar a alguien intento imaginar cómo me sentiría si estuviera en su lugar					

B.4 STCI

11.1. Adaptación al castellano de la *State-Trait-Cheerfulness-Inventory* (Rasgo)

A continuación podrás ver una serie de frases sobre tu forma de pensar y tu estado de ánimo **en general**. Tu tarea consiste en usar estas frases para describir de manera tan exacta como sea posible tu forma **habitual** de actuar y pensar. Para ello, y después de leer cada frase, tendrás que señalar con una cruz (X) un número del 1 al 4. Cada número se asocia a una de las siguientes opciones de respuesta:

(1) Totalmente en desacuerdo

(2) Moderadamente en desacuerdo

(3) Moderadamente de acuerdo

(4) Totalmente de acuerdo

Por ejemplo:

Soy una persona activa..(1) (2) (3) (4)

Si estás *totalmente de acuerdo* con esta afirmación, es decir, si **en general eres** una persona activa, marca con una cruz (X) el número (4). Si estás *totalmente en desacuerdo*, es decir, si **en general no eres** una persona activa, marca con una cruz (X) el número (1). Marca el número (2) si estás *moderadamente en desacuerdo* con el hecho de que seas una persona activa, o el (3) si estás *moderadamente de acuerdo* con dicha frase.

Cuando tengas dificultades para elegir una respuesta, señala la opción que más se aproxime.

En caso de equivocación, tacha la opción elegida, y haz una nueva cruz sobre la opción que elijas.

Por favor, *responde a todas las cuestiones.*

Ya puedes pasar la hoja y comenzar a responder, gracias.

1. Mi estado de ánimo suele ser malo	1	2	3	4
2. Suelo estar serio	1	2	3	4
3. Mi estilo de vida me hace ver lo bueno de los acontecimientos negativos	1	2	3	4
4. Suelo estar atento a los chistes o bromas	1	2	3	4
5. Para sentirme bien conmigo mismo necesito hacer todo lo que tenía planificado para ese día	1	2	3	4
6. Cuando me reúno con mis amigos solemos estar bromeando	1	2	3	4
7. Me desquician esos momentos en los que la gente no para de reírse	1	2	3	4
8. Cuando se analizan asuntos aparentemente simples, a menudo resultan ser más importantes de lo que parecen	1	2	3	4
9. Es bastante fácil hacerme sonreír	1	2	3	4
10. No me gusta estar con la gente que está siempre haciendo tonterías	1	2	3	4
11. Suelo ser bastante formal	1	2	3	4
12. Soy una persona jovial	1	2	3	4
13. Son muchos los días en los que siento que estoy enfadado con el mundo	1	2	3	4
14. Suelo leer la sección de humor en el periódico	1	2	3	4
15. Me comporto de manera desagradable con las personas que no paran de contar chistes	1	2	3	4
16. Las personas que están siempre alegres y contentas me resultan inmaduras	1	2	3	4
17. Me considero una persona reflexiva	1	2	3	4
18. Comparado con los demás puedo resultar gruñón y cascarrabias	1	2	3	4
19. Mi estado de ánimo hace que me resulte difícil pasármelo bien	1	2	3	4
20. Soy una persona feliz	1	2	3	4
21. Necesito pensar detenidamente las cosas antes de actuar	1	2	3	4
22. Me pueden hacer reír con facilidad	1	2	3	4
23. A veces tengo una sensación como de "vacío interior"	1	2	3	4
24. A menudo pienso que la gente debería reírse de sus propios	1	2	3	4

problemas				
25. Planeo las cosas que voy a hacer y tomo mis decisiones pensando en que los resultados me sean útiles a largo plazo	1	2	3	4
26. A menudo me siento abatido	1	2	3	4
27. Me identifico con el refrán "No hay mal que por bien no venga"	1	2	3	4
28. Me resulta innecesario y molesto que exageren al hablarme	1	2	3	4
29. La vida diaria me ofrece numerosas oportunidades para reírme	1	2	3	4
30. Muchas veces pienso, "¡Por favor, no me molestéis hoy!"	1	2	3	4
31. La gente no se da cuenta de la importancia que tienen la mayoría de las cosas que suceden a nuestro alrededor	1	2	3	4
32. Con frecuencia me pregunto por qué la gente gasta su tiempo en actividades que realmente no sirven para nada	1	2	3	4
33. Me parece mal que la gente invierta tanto tiempo y dinero en divertirse	1	2	3	4
34. Cuando estoy angustiado nada consigue alegrarme	1	2	3	4
35. Sonrío a menudo	1	2	3	4
36. Me gusta gastarle bromas a la gente	1	2	3	4
37. En todo lo que hago siempre tengo en cuenta las posibles consecuencias, comparando los pros y contras cuidadosamente	1	2	3	4
38. Cuando los amigos intentan animarme haciendo bromas, a veces llego a ponerme de mal humor	1	2	3	4
39. Creo que incluso de las situaciones más difíciles de la vida pueden obtenerse cosas positivas	1	2	3	4
40. Los que me conocen dicen que siempre parece que estoy pensativo	1	2	3	4
41. A menudo silbo o canto en voz alta por puro placer	1	2	3	4
42. Muchos días pienso, "Hoy me he levantado con mal pie"	1	2	3	4
43. Suelo mostrar mi desaprobación hacia las chiquilladas y tonterías que divierten a algunas personas	1	2	3	4
44. A menudo no quepo en mí de alegría	1	2	3	4
45. A menudo veo graciosas las situaciones más cotidianas	1	2	3	4
46. No me tomo los problemas diarios a la ligera	1	2	3	4

47. La gente que está contenta puede llegar a "sacarme de mis casillas"	1	2	3	4
48. Son muchas las veces en las que me siento mal anímicamente	1	2	3	4
49. Las cosas marcharían mejor si se analizara todo con mayor profundidad	1	2	3	4
50. Me río a menudo	1	2	3	4
51. Me resulta muy difícil pasármelo bien cuando estoy con gente que está divirtiéndose	1	2	3	4
52. No me interesa la gente que invierte su tiempo en fiestas y cosas parecidas	1	2	3	4
53. A veces me siento decaído	1	2	3	4
54. Soy una persona alegre	1	2	3	4
55. Frecuentemente estoy malhumorado	1	2	3	4
56. Cuando me apetece divertirme, sé cómo conseguirlo	1	2	3	4
57. A menudo soy insoportable	1	2	3	4
58. Considero que la mayoría de las situaciones diarias son serias y muy importantes	1	2	3	4
59. Suelo ser de los que cuentan chistes en las reuniones	1	2	3	4
60. No soporto los programas televisivos de humor	1	2	3	4
61. Muchos de los problemas que surgen en la vida diaria tienen su lado positivo	1	2	3	4
62. A menudo tengo un mal estado de ánimo	1	2	3	4
63. Me considero más responsable que la mayoría de la gente que me rodea	1	2	3	4
64. En las conversaciones siempre evito el uso de exageraciones, adornos o rodeos	1	2	3	4
65. Suelo estar de buen humor aunque no tenga motivos para ello	1	2	3	4
66. Con frecuencia el más mínimo contratiempo me hace explotar de rabia	1	2	3	4
67. No comprendo como otros pueden malgastar su tiempo en hacer cosas sin sentido	1	2	3	4
68. Siempre estoy listo para entablar una conversación graciosa o en tono de guasa	1	2	3	4

69. Me enfado más frecuentemente que la mayoría de la gente que me rodea	1	2	3	4
70. Creo que el humor está por todos lados y sólo hace falta prestar atención	1	2	3	4
71. Mi vida diaria está fundamentalmente ocupada por asuntos importantes	1	2	3	4
72. Soy una persona bastante triste	1	2	3	4
73. Normalmente planifico las cosas con mucho tiempo de antelación, poniéndome metas a largo plazo	1	2	3	4
74. Afrontar los problemas tranquilamente hace que nos demos cuenta de que no son tan importantes	1	2	3	4
75. Soy una persona seria	1	2	3	4
76. Disfruto viendo películas de humor	1	2	3	4
77. No suelo pasármelo bien ni en los momentos más divertidos	1	2	3	4
78. Prefiero a la gente que se comunica de manera clara y directa	1	2	3	4
79. Creo que el fracaso es una buena oportunidad para aprender a ser mejor persona	1	2	3	4
80. Normalmente estoy animado	1	2	3	4
81. Debido a mi mal estado de ánimo son muchos los días en los que pienso que lo mejor es quedarme en la cama	1	2	3	4
82. Necesito tener planificado de antemano todo lo que voy a hacer	1	2	3	4
83. Disfruto haciendo reír a mis amigos	1	2	3	4
84. Suelo estar triste	1	2	3	4
85. Me gusta entretener a mis amigos contándoles historias divertidas	1	2	3	4
86. Sólo hago cosas prácticas porque todo lo demás es malgastar el tiempo	1	2	3	4
87. Incluso las situaciones difíciles las abordo con un "espíritu alegre"	1	2	3	4
88. A menudo me siento desganado	1	2	3	4
89. Me molestan ese tipo de personas que están siempre contando chistes	1	2	3	4
90. Cuando hablo con los demás intento tener un intercambio de ideas sobrio y objetivo	1	2	3	4

91. Con frecuencia me digo a mí mismo que no he tenido un buen día	1	2	3	4
92. Disfruto bromeando o contando chistes cuando estoy con gente	1	2	3	4
93. Incluso las cosas aparentemente sin importancia tienen que ser tratadas seria y responsablemente	1	2	3	4
94. Suelo ver como graciosas cosas que el resto de la gente no ve	1	2	3	4
95. Me encanta estar en una de esas reuniones donde la gente no para de contar chistes	1	2	3	4
96. Suelo sentirme bien aún sin motivos	1	2	3	4
97. Si uno no tiene claro para qué sirve lo que está haciendo, seguramente es que no sirve para nada	1	2	3	4
98. Normalmente soy el que anima las reuniones	1	2	3	4
99. Perder el tiempo haciendo cosas por hacerlas es una estupidez	1	2	3	4
100. Me siento mal cuando no hago las cosas tal y como las tenía planeadas	1	2	3	4
101. Me gusta ser concreto y directo cuando hablo con los demás	1	2	3	4
102. Si me siento mal, nadie lo puede cambiar	1	2	3	4
103. Normalmente tengo un humor excelente	1	2	3	4
104. A menudo me pregunto por qué la gente no es clara en lo que quiere decir	1	2	3	4

C   JOKES SURVEY

C.1 JOKES

Job

Entrevista de empleo
- **¿Nivel de inglés?**
- **Alto.**
- **Traduzca Juguete.**
- **Toy.**
- **Úselo en una oración.**
- **¡Yo TOY triste!**
- **¡CONTRATADA!**

Doctor

¡Relájate David! Es sólo una pequeña cirugía ¡No entres en pánico!

Mi nombre no es David.

Ya lo sé. Yo soy David.

Politic

ESTÁ la situación tan tensa para hablar de izquierda y de derecha que cuando me piden información en la calle, yo ya digo "sigue siempre RECTO"

Beer

Pues no iba a beber pero ha venido mi gato y ha dicho:

¡¡Mahou!!

Y yo he dicho "¡¡VENGA!!"

Candidate

Entrevistador: ¿Dónde te ves en 5 años?

Yo: Pues yo diría que mi mayor defecto es escuchar.

Store

Mire a Ana haciendo fila…

lleva 3 horas así

no sabiendo que son maniquíes

Dog

¿su perro muerde?

No. Es peor, él juzga.

Soccer

Dos futbolistas que están en un partido muy duro.

Dice **Uno** a **Otro**:

El **Uno**: "Si sigues asííí… te voy a romper el hueso de la pierna"

El **Otro**: "Se dice Tíbia"

El **Uno**: "Pues eso... TIBIÁ romper el hueso de la pierna"

TOC

– Fui al psiquiatra y he sido diagnosticado con COT.
– ¡Oye! Quieres decir, ¿TOC?
– Sí, pero he puesto en el orden alfabética, como debe ser.

Photoshop

C.2 OTHER STIMULI

Advertisement

News

News
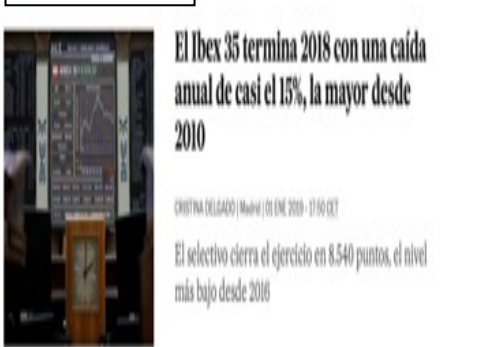
Advertisement

Advertisement

C.3 SURVEY DESIGN

Stimuli order of the jokes and not jokes order in the survey with university students

Advert= Advertisement; Candi= Candidate; and PhSh=Photoshop

C.4 JOKES IDENTIFICATION

Data of the number of participants who identified and labeled the ten selected stimulus jokes as jokes and others in the survey with university students of Almería. Jokes selected for Study 1 and 2 are emphasized with the green background.

Jokes identified as joke

Named Joke	Number of participants Identification		% joke as joke
	Joke	Other	
Job	102	5	95.3
Doctor	103	4	96.3
Politic	56	51	52.3
Beer	102	5	95.3
Candidate	96	11	89.7
Store	102	5	95.3
Dog	102	5	95.3
Soccer	105	2	98.1
TOC	101	6	94.4
Photoshop	75	37	70.1

C.5 FUNNY LEVEL PER JOKE

Data of the number of funny levels of each joke that was labeled as a joke. Jokes selected for Study 1 and 2 are emphasized with the green background.

Number of participants of funny level per joke

Joke	Funny level					*M*
Stimulus	Not at all (0)	Slightly (1)	Moderately (2)	Very (3)	Extremely (4)	
Job	6	28	44	18	6	1,91
Doctor	12	22	35	25	9	1,97
Politic	7	17	21	8	3	1,7
Beer	9	17	45	25	6	2,02
Candidate	23	32	25	11	5	1,41
Store	25	24	34	15	4	1,5
Dog	15	19	36	26	6	1,89
Soccer	12	24	39	28	2	1,85
TOC	24	25	33	16	3	1,49
Photoshop	14	18	22	13	3	1,61

C.6 INDIVIDUAL DATA PER JOKE
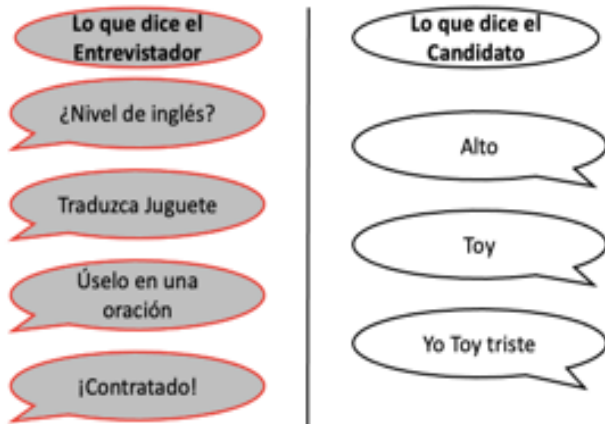
	M/F	AGE	Graduation*	Jokes									
				Job	Doctor	Politic	Beer	Cand	Store	Dog	Soccer	Toc	PhSh
P1	F	19	Magisterio	1	0	3	4	1	1	1	1	2	Other
P2	M	33	Informática	2	3	1	3	2	1	3	2	2	3
P3	F	21	Educación	3	2	News	1	0	0	1	2	2	3
P4	M	28	Máster en dirección y economía de empresa	2	2	Other	Advert	3	3	3	2	Other	Adver
P5	F	24	Derecho	0	1	1	2	2	0	0	1	0	Adver
P6	M	19	Ingeniaría Informática	2	3	Other	3	1	2	2	3	3	Other
P7	M	24	Ingeniaría Eléctrica Industrial	2	2	0	3	0	1	2	2	0	Advert
P8	F	19	Química	3	2	3	1	0	2	3	3	2	0
P9	F	18	Marketing	2	2	2	3	3	2	3	2	2	1
P10	F	23	Máster estudios ingleses	2	1	2	2	2	3	2	3	2	Other
P11	F	27	Máster estudios ingleses	2	2	2	3	2	2	3	3	3	3
P12	F	21	Química	2	2	Other	0	1	0	3	2	3	1
P13	M	29	Máster profesorado 2° economía	2	3	Other	2	3	2	Other	3	2	Other
P14	F	20	Ingeniaría Informatica	2	3	1	2	1	0	0	0	1	1
P15	M	18	Turismo	2	3	Other	2	1	2	1	3	3	2
P16	M	19	Ingeniaría Informática	2	2	News	3	1	1	2	2	1	2
P17	F	24	Máster Diseño ingeniería y arquitectura	1	3	3	2	0	2	1	1	0	2
P18	F	26	Máster de Profesorado de E.S.O.	2	1	0	2	2	1	2	3	2	2
P19	F	28	Máster en Innovación Educativa	2	1	Other	2	Adver	2	0	0	Adver	0
P20	F	27	Química	1	0	2	3	2	2	2	1	2	2
P21	F	30	Máster P. R. L.	2	3	Other	0	0	0	0	0	0	0
P22	M	21	Derecho	1	3	Other	0	2	1	2	2	0	0
P23	M	18	Marketing	2	3	3	3	2	1	4	2	2	3
P24	M	28	CAFD	4	4	4	2	4	4	News	1	1	4
P25	M	21	Matemática	1	1	2	2	3	2	1	2	2	1
P26	M	26	FiCo	3	4	2	3	2	1	Adver	1	3	Other
P27	F	18	Matemática	1	1	Other	1	2	0	Other	News	0	0
P28	M	23	Ingeniaría Agrícola	Other	1	Adver	News	Other	News	News	2	3	Adver
P29	M	19	Informática	1	2	2	2	1	1	1	1	1	1
P30	M	18	Derecho	3	2	Other	4	1	0	0	3	1	1
P31	M	19	Ingeniaría Eléctrica Industrial	2	3	1	2	1	2	2	1	0	0
P32	F	25	Máster Gestión Información y de Idiomas (filología)	1	Other	2	2	0	Other	0	Other	Other	Other
P33	M	21	Matemática	3	4	Adver	3	4	0	2	0	2	0
P34	M	21	Historia	1	1	Other	1	2	3	3	1	2	2
P35	M	24	Ingeniaría Química	3	4	News	3	1	1	1	0	0	Other
P36	M	20	Fisioterapia	2	3	Adver	1	0	0	2	1	2	1
P37	F	25	Máster en Investigación en ciencia del comportamiento (Psicología)	3	3	2	3	4	2	4	2	4	Other
P38	M	22	Ingeniaría Agrícola	1	2	Adver	1	0	0	0	1	0	0
P39	F	24	Estudios Ingleses	2	1	Adver	2	Other	1	2	1	2	2
P40	F	21	Biotecnología	1	1	2	2	1	2	3	3	3	2
P41	F	25	Marketing	1	2	0	3	0	0	0	0	1	0
P42	F	22	Enfermería	4	4	4	3	2	3	3	4	3	3
P43	F	19	Enfermería	2	2	1	3	3	2	3	3	2	2
P44	M	22	Marketing	2	2	1	2	1	2	2	2	2	2
P45	F	19	Psicología	3	4	1	2	2	3	4	3	2	3
P46	M	19	Ciencias Ambientales	3	4	News	2	1	2	2	2	1	Other
P47	M	19	Ciencias Ambientales	0	1	2	2	1	0	2	3	3	3
P48	M	24	Derecho	2	2	Other	1	1	2	2	3	1	Other
P49	F	22	RRHH	Adver	2	Other	2	1	1	1	1	1	2
P50	M	22	RRHH	2	2	1	2	2	1	3	2	1	2
P51	M	22	GAP (Gestión A. Publicas)	1	2	3	Adver	Other	4	0	2	2	4
P52	F	23	Educación	3	2	2	2	0	1	2	2	2	0
P53	F	20	Psicología	0	1	News	2	2	3	4	2	0	1

	M/F	AGE	Graduation*	Job	Doctor	Politic	Beer	Cand	Store	Dog	Soccer	Toc	PhSh
				Jokes									

	M/F	AGE	Graduation*	Job	Doctor	Politic	Beer	Cand	Store	Dog	Soccer	Toc	PhSh
P54	F	20	Turismo	2	Other	Other	2	Other	Other	2	2	Other	Other
P55	F	22	Psicología	2	0	1	1	0	0	2	2	0	0
P56	M	19	Química	2	3	Other	1	1	1	2	2	1	1
P57	M	19	Ingeniaría Agrícola	2	3	2	3	3	3	2	3	2	1
P58	F	20	Psicología	2	2	Other	3	2	3	3	3	3	3
P59	M	21	Matemática	0	0	News	0	Other	0	0	1	0	0
P60	M	21	Educación Primaria	2	3	Other	2	1	2	2	3	2	Other
P61	M	19	Historia	1	3	0	1	2	0	2	0	0	1
P62	F	20	Historia	2	1	Other	0	1	2	3	2	1	2
P63	F	19	Educación Infantil	2	1	3	2	1	2	1	2	1	0
P64	M	24	Historia	1	1	Other	1	1	2	3	1	1	Adver
P65	M	20	Magisterio	2	3	News	2	2	3	3	2	2	2
P66	M	21	ADE	2	3	2	4	0	2	1	3	1	Other
P67	M	23	Fisioterapia	3	1	2	3	3	3	3	4	4	Other
P68	M	23	Máster de Informática	3	3	2	2	2	2	1	2	2	1
P69	M	25	ADE	1	3	News	2	2	1	2	3	3	Other
P70	F	22	Psicología	3	4	News	4	3	3	4	3	4	2
P71	F	22	Educación Infantil	2	0	News	0	0	0	1	2	0	2
P72	M	19	Marketing	2	3	1	2	3	3	1	3	2	Other
P73	F	21	Finanzas	1	1	Other	2	1	2	2	3	0	Other
P74	M	20	Enfermería	2	Other	1	0	0	2	2	1	2	Other
P75	M	19	Biotecnología	1	2	Other	1	1	1	3	1	2	1
P76	F	18	Biotecnología	3	2	3	2	0	3	1	2	3	2
P77	F	23	MIBAL (Estudios Ingleses)	1	2	0	1	2	2	2	3	1	Other
P78	M	19	ADE	1	2	Other	2	Other	1	3	2	1	1
P79	M	22	Biotecnología	4	4	Other	2	4	4	0	1	Other	0
P80	F	19	Marketing	2	3	Other	1	2	0	0	1	1	Other
P81	M	22	Psicología	3	1	Other	2	0	3	2	3	3	Other
P82	M	27	Enfermería	Other	3	2	3	2	2	2	2	1	Other
P83	F	18	Enfermería	4	Other	1	2	Other	2	2	3	2	Other
P84	M	23	Psicología	1	0	1	2	1	1	1	2	0	Other
P85	F	20	Magisterio	1	0	0	2	1	1	2	0	0	Adver
P86	M	20	Estudios Ingleses y Filología Hispánica (doble grado)	4	2	2	4	0	0	4	2	1	4
P87	F	19	Estudios Ingleses y Filología Hispánica (doble grado)	2	2	1	4	0	0	3	3	2	3
P88	F	25	Ingeniaría	0	1	0	2	2	2	2	2	0	3
P89	M	20	Marketing	2	0	News	2	1	Other	1	2	1	1
P90	M	21	Ingeniaría Informática	1	2	Other	0	0	0	0	0	1	Other
P91	M	20	Informática	1	2	News	2	0	1	3	1	1	2
P92	M	28	Máster Prevención de Riesgos Laborales (Primaria)	2	0	News	3	4	Other	1	2	2	1
P93	F	26	Máster Desarrollo Local (Gestión Pública)	2	0	Other	0	1	2	2	2	1	2
P94	M	25	Ingeniaría Mecánica	2	3	Other	Adver	1	2	3	3	0	Other
P95	F	19	Biotecnología	1	1	1	2	Other	0	0	1	2	Other
P96	F	26	RRLL y RRHH	Other	1	Adver	2	0	3	3	1	3	Other
P97	M	19	RRHH	3	1	2	3	Other	2	3	2	2	3
P98	M	21	Ingeniaría Eléctrica Industrial	1	0	Other	3	Other	1	0	0	2	Other
P99	M	21	Economía	3	2	News	Adver	1	0	2	0	0	Other
P100	F	21	Derecho	4	2	4	3	3	4	1	3	0	2
P101	M	26	FiCo	3	2	Other	3	1	1	2	3	Other	Other
P102	M	22	RRHH	0	0	2	3	0	2	2	1	0	1
P103	M	21	Economía	2	3	1	1	1	0	2	2	1	2
P104	M	19	Derecho	1	2	1	2	3	2	3	2	3	2
P105	F	19	Turismo	2	2	Other	2	1	0	3	2	0	3
P106	F	19	Derecho	1	2	2	1	2	0	3	1	3	1
P107	F	22	Ingeniaría Eléctrica Industrial	3	2	3	1	0	1	1	0	0	3

*Graduations are in Spanish language; Cand= Candidate; and PhSh= Phostoshop

D. STUDY 1

D.1 JOKES IN SPANISH

Name	Joke
Doctor	(Audio) Médico: "¡*Relájate David! Es solo una pequeña cirugía, No entrés en pánico.*" Paciente "*Mi nombre no es David.*" Médico: "*Ya lo sé… Yo soy David.*"
Beer	
Job	
Soccer	**Dos futbolistas que están en un partido muy duro.** Dice **Uno** a **Otro**: **El Uno:** "*Si sigues **asííí**… te voy a romper el hueso de la pierna*" **El Otro:** "*Se dice tibia*" **El Uno***: "Pues eso… TIBIÁ romper el hueso de la pierna"*

D.2 IN BETWEEN ACTIVITIES ORDER

List of brief activities and sequence of presentation

Presentation Sequence (Time)				
1. Athletic Video Situation (57s)	2. Weather Forecast of the Day (12s)	3. Instruments Memory Task (60s)	4. Screensaver 1 (12s)	
5. Find Pictures Attention Task (60s)	6. Screensaver 2 (12s)	7. Poetry Situation (45s)	8. Weather Forecast of the Week (12s)	9. Screensaver 3 (12s)
10. Mandala Video 1 (12s)	11. Politic Situation (50s)	12. Find Pictures Attention Task (60s)	13. Screensaver 4 (12s)	
14. Quarterly Weather Forecast (12s)	15. Mandala Video 3 (12s)	16. Man in the Garden Situation (20s)	17. Painting Memory Task (60s)	18. Screensaver 5 (12s)
19. Athletic Video Situation (53s)	20. Weather Forecast of the Day (12s)	21. Clothes Memory Task (60s)	22. Screensaver 6 (12s)	
23. Bottle Counting Attention Task (60s)	24. Screensaver 7 (12s)	25. Poetry Situation (45s)	26. Weather Forecast of the Week (12s)	27. Screensaver 8 (12s)
28. Screensaver 9 (12s)	29. Politic Situation (33s)	30. Toy Counting Attention Task (60s)	31. Screensaver 10 (12s)	
32. Quarterly Weather Forecast (12s)	33. Mandala Video 4 (12s)	34. Man in the Garden Situation (20s)	35. Painting Memory Task (60s)	36. Mandala Video 5 (12s)

The table shows the in-between activities and their sequence of presentation in Control and Experimental conditions. The numbers denote the sequence of presentation, with 1 being the first and 36 the last. In parentheses is the duration of each task.

D.3. INSTRUCTIONS FOR SCENE ACTIVITIES

Instructions for scene activities

Activity	Scene Instruction
1. Athletic Video Scene	"*You are going to see a true story ... The story happened in 2012, where the Spanish athlete refused to win the track and field event, giving the victory to the Kenyan ... Click on "continue" to see the full story*." Followed by the video scene
11. Politic Scene	"*Jaime has three friends: B1, B2, and B3. 'Click continue'... Jaime and all the B's have the same political, social, and economic vision... However, recently, B3 met some friends who are making him think ideas contrary to the B's... These friends are the N1, N2, and N3... (speech bubble of B3 appears). My other friends are making me change my mind. 'Click Continue' Now, imagine that B3 invites all the Bs and the Ns to get together for dinner... Jaime accepts the invitation and goes to B3's house... But when he arrives at B3's house, he learns that his friends will not be there... So, Jaime meets only B3's friends...*"
16. Man in the Garden Scene	"*I heard a bird in my garden and went to see it. When I got to the garden, I found that my husband was there. He loves to appreciate the birds and the movement of the leaves. He also loves to listen to the sounds of nature, especially birds.*" The participant clicked '*continue*,'"
17. Athletic Video Scene	"*You are about to see a true story ... British athlete collapses, and his brother helps him cross the finish line of the Cozumel Triathlon. Click 'continue' to see what happened.*" Followed by the video scene.

D.4. INSTRUCTIONS AND DESCRIPTION OF IN-BETWEEN ACTIVITIES

Activity	Task Instruction	Task Description
Instrument or Clothes Memory Task	*"Now, you will see different musical instruments. Try to memorize the order in which the instruments are presented. Please click 'continue' to continue."*	Then, three instruments/clothes appeared on the screen for 6s. The objects disappeared, and the screen was grayed out for 5 seconds. Then the participant was asked to select one of the three options of instruments/clothes. The task continued in the same way, gradually increasing the number of objects to memorize and the time of gray screen between instruments and questions (6 and 9 and 12s and 18s, respectively).
Find Pictures Attention Task	*"Now, different figures will appear on the screen. Your task is to find a figure identical to the one presented to you at the top left. When you find it, click on the shape with the mouse. Click 'Continue.'"*	Then, 45 to 48 figures appeared, and the participant should find the figure identical to the one presented at the top left. Figure Then, a new figure to find would appear at the top left, and the participant was to follow along like this until the task ended. The task was scheduled to end after 60 s.
Painting Memory Task	*"Now, you will see different paintings. Your task is to look at the missing part of the picture and answer the question. Please click 'continue' to proceed."*	After 2 seconds of the gray screen, a painting without a part appeared on the screen for 8 seconds. The painting disappeared, and the screen remained gray for 6 seconds. Then the participant had to select one of two options for the missing part of the painting. Upon selecting the correct part, the screen would turn gray again for 4 seconds, and a new frame would appear. The task continued in the same way with the appearance of two more frames.
Bottle Counting Attention Task	*"Some bottles will appear on the screen. Your task is to count them and follow the instructions. Click 'continue.'"*	Bottles appeared in a temporal sequence from 1 to 10 bottles. After seeing the bottles, the participant answered the following question *"How many bottles did you just see?"* The participant typed with the numbers on the keyboard the number of bottles and pressed continue. The task was scheduled to end after 60 s.
Dolls Counting Attention Task	*"Next, a race will appear. Your task is to count the number of dolls that cross the finish line and follow the instructions. When you finish, click 'Continue' to continue."*	Eight identical dolls, differing only in color, appeared on the screen. The dolls started from one point and stopped running the race either before or after crossing the finish line. After seeing the dolls crossing the finish line, the participant answered the following question *"How many dolls crossed the finish line?"* The participant typed with the numbers on the keyboard the number of dolls and pressed continue. The task was scheduled to end after 60 s.

D.5. MEMORY TASK

D.6 ATTENTION TASK

D.7 ACTIVITY "POLITIC SITUATION"

Jaime, tiene tres amigos… : B1, B2 y B3

Jaime, B0

B1

B3

B2

CONTINUAR

Jaime y todos los B's tienen la misma visión política, social y económica

Sin embargo, recientemente, B3 conoció a unos amigos que le están haciendo pensar ideas contrarias a los B's… Estos amigos son los N1, N2 y N3
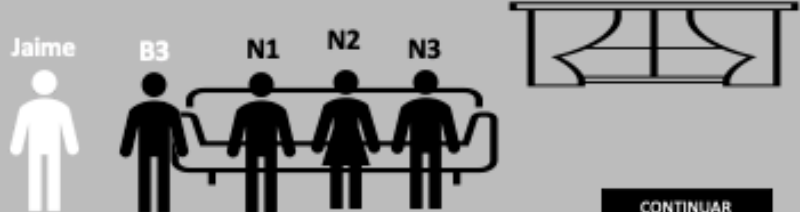
Jaime

B2

B2

B3

Mis otros amigos
N1 N2 N3

me están haciendo
cambiar de idea.

CONTINUAR

Ahora, imagina que B3 invita a todos los B's y a todos los N's para reunirse a una cena …

Jaime acepta la invitación y va a la casa de B3
Pero cuando llega a la casa de B3, se entera de que sus amigos no irán

Así que Jaime se encuentra en estas circunstancias…

Jaime   B3   N1   N2   N3

CONTINUAR

D.6 ACTIVITY "WEATHER FORECAST"

D.7. INDIVIDUAL DATA CONTROL CONDITION

	PART	M/F	AGE	QUESTIONNAIRS			
				AAQ-II	PT	CH	SH
C	P1	F	22	28	27	132	66
O	P2	F	22	27	30	127	93
N	P3	F	25	43	31	120	82
T	P4	F	22	35	30	84	81
R	P5	M	22	9	23	112	96
O	P6	F	24	41	27	101	82
L	P7	F	25	31	33	135	87
	P8	F	21	26	27	93	65
	P9	F	20	23	23	115	93
	P10	M	22	10	32	141	68
	P11	M	37	42	15	101	106

D.8. INDIVIDUAL DATA EXPERIMENTAL CONDITION

	PART	M/F	AGE	QUESTIONNAIRS			
				AAQ-II	PT	CH	SH
E X P E R I M E N T A L	P1	M	26	28	28	126	75
	P2	F	21	23	25	123	82
	P3	F	23	30	23	119	78
	P4	M	22	19	24	87	99
	P5	F	21	26	31	102	99
	P6	F	22	17	29	129	81
	P7	M	22	36	26	132	90
	P8	F	21	13	32	137	90
	P9	F	23	13	34	118	85
	P10	M	21	7	29	137	63
	P11	M	21	26	24	93	105
	P12	F	24	16	24	122	79

E. STUDY 2

E.1 JOKES FORMAT MODIFIED IN SPANISH

Jokes in Spanish

Joke' Name	Joke
Doctor	**Doctor**: "¡*Relájate David! Es solo una pequeña cirugía, No entrés en pánico.*" **Paciente** "*Mi nombre no es David.*" **Doctor**: "*Ya lo sé… Yo soy David.*"
Beer	

Luis
online

Mira, Juan, es que no iba a beber... 11:03

Pero ha venido mi gato y ha dicho.. 11:03

¡¡MAHOU!! 11:03

Y yo he dicho…
¡¡VENGAAA!! 11:03
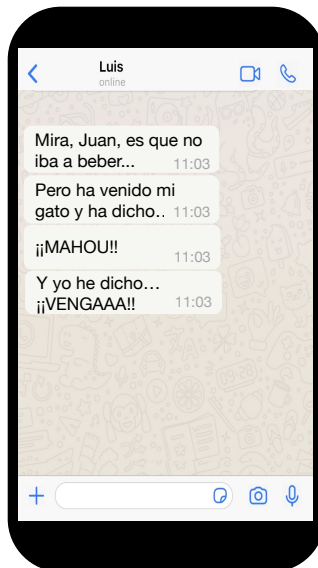
E.2 IN BETWEEN ACTIVITIES ORDER

List of brief activities and sequence of presentation. In-between activities and their sequence of presentation in all conditions. The numbers denote the sequence of presentation, with 1 being the first and 44 the last. In parentheses is the duration of each task.

Presentation Sequence (Time)					
1. Screensaver 1 (12s)	2. Student situation (14s/33s/46s)*	3. Weather Forecast of the Day (12s)	4. Screensaver 2 (12s)	5. Instruments Memory Task (60s)	6. Screensaver 3 (12s)
7. Screensaver 1 (12s)	8. Athletic Video Situation (57s)	9. Weather Forecast of the Week (12s)	10. Find Pictures Attention Task (60s)	11. Screensaver 4 (12s)	
12. Screensaver 5 (12s)	13. Politic Situation (50s)	14. Mandala Video 1 (12s)	15. Find Pictures Attention Task (60s)	16. Screensaver 6 (12s)	
17. Painting Memory Task (60s)	18. Quarterly Weather Forecast (12s)	19. Mandala Video 2 (12s)	20. Man in the Garden Situation (20s)	21. Circles attention Task (60s)	22. Screensaver 7 (12s)
23. Screensaver 7 (12s)	24. Student situation (14s)	25. Weather Forecast of the Day (12s)	26. Mandala Video 1 (12s)	27. Clothes Memory Task (60s)	28. Screensaver 2 (12s)
29. Screensaver 8 (12s)	30. Athletic Video Situation (53s)	31. Weather Forecast of the Week (12s)	32. Bottle Counting Attention Task (60s)	33. Screensaver 9 (12s)	
34. Screensaver 3 (12s)	35. Politic Situation (33s)	36. Screensaver 5 (12s)	37. Toy Counting Attention Task (60s)	38. Screensaver 10 (12s)	
39. Painting Memory Task (60s)	40. Quarterly Weather Forecast (12s)	41. Mandala Video 4 (12s)	42. Man in the Garden Situation (20s)	43. Circles attention Task (60s)	44. Mandala Video 1 (12s)

E.3. INDIVIDUAL DATA EXPERIMENT 1

		M/F	AGE	GRADUACIÓN*	QUESTIONNAIRS			
					AAQ-II	PT	CH	SH
C O N T R O L	P1	M	23	Psicología	24	20	129	89
	P2	F	20	Psicología	39	35	114	70
	P3	F	23	Fisioterapia	39	26	102	100
	P4	F	21	Magisterio	22	23	113	85
	P5	F	24	Magisterio	38	24	115	85
	P6	F	25	Psicología	34	27	112	89
	P7	F	22	Ed. Física	23	25	107	93
	P8	M	24	Ed. Física	25	29	85	70
	P9	M	22	Magisterio	24	25	133	74
	P10	M	18	CCAA	18	24	118	78
M I X C O N T D E S L	P11	F	22	Psicología	21	25	110	76
	P12	F	22	Magisterio	27	27	121	80
	P13	M	18	Economía	43	29	98	80
	P14	F	19	Psicología	23	25	102	83
	P15	F	21	Psicología	19	28	126	88
	P16	F	19	Turismo	22	27	118	83
	P17	M	22	Química	35	30	97	95
	P18	F	27	Oposiciones	12	30	145	77
	P19	F	40	Turismo	32	25	114	67
	P20	F	33	Psicología	18	22	101	88

E.3. INDIVIDUAL DATA EXPERIMENT 2

	PART	M/F	AGE	GRADUACIÓN*	QUESTIONNAIRS			
					AAQ-II	PT	CH	SH
C O N T R O L	P21	M	22	Turismo	27	29	115	100
	P22	F	19	Educación Infantil	20	26	101	67
	P23	F	18	Educación Infantil	13	25	133	70
	P24	F	26	Turismo	38	31	104	114
	P25	F	19	Psicología	40	29	123	84
	P26	F	18	Psicología	15	27	140	82
	P27	F	22	Turismo	32	25	91	82
	P28	M	19	Biotecnología	37	30	101	76
	P29	M	19	Biotecnología	22	26	118	80
M I X C O N T D E S L	P30	F	20	Psicología	30	27	110	76
	P31	F	20	Psicología	21	25	121	80
	P32	M	20	Psicología	27	27	98	80
	P33	M	23	Psicología	43	29	102	83
	P34	M	19	Economía	23	25	126	88
	P35	F	21	Fisioterapia	19	28	118	83
	P36	F	19	Marketing	22	27	97	95
	P37	F	20	Trabajo Social	35	30	145	77
	P38	F	24	Trabajo Social	12	30	114	67
	P39	F	29	Psicología	32	25	101	88
D I S C C O N T D E S L	P40	F	18	Fisioterapia	15	26	116	115
	P41	F	20	Psicología	27	31	137	97
	P42	F	20	Fisioterapia	14	26	118	90
	P43	F	20	Psicología	14	35	92	105
	P44	F	19	Psicología	36	30	134	80
	P45	M	23	Derecho	33	30	126	65
	P46	M	21	Biotecnología	29	24	95	111
	P47	M	18	Agronomía	15	22	133	88
	P48	M	20	Biotecnología	27	23	104	106
I D C O N T D E S L	P49	F	22	Psicología	21	30	121	103
	P50	F	22	Psicología	19	29	121	73
	P51	F	23	Derecho	16	30	135	79
	P52	F	22	Derecho	17	34	134	98
	P53	M	22	Educación física	11	25	124	95
	P54	F	22	Psicología	14	27	94	98
	P55	M	23	Educación infantil	18	33	125	76
	P56	F	24	Magisterio	13	34	146	59
	P57	F	25	Biología	22	29	102	93
	P58	M	28	Biotecnología	30	30	123	90

F. INTEROBSERVER

F.1. INTEROBSERVER TRAINNING

The experimenter trained two interobserver to identify the presence or absence of smiling responses. The experimenter first explained the characteristics of the smile expression, and those expression that were not (see below):
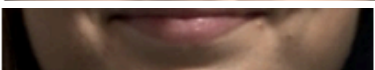
Ejemplos
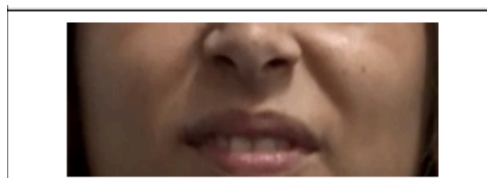**Rostro neutro**:

RISA:

1) **Mejillas hacia arriba**

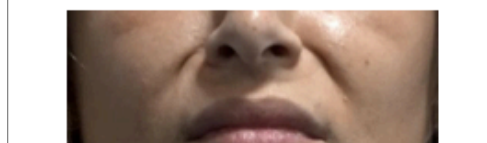2) **Comisura de los labios hacia arriba, tanto en un lado como en ambos.**
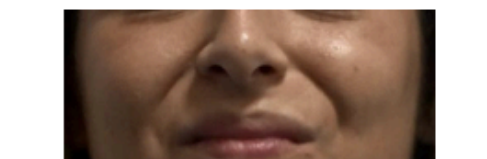
DÓNDE FIJARSE:

Ficha de auxilio:

No es:
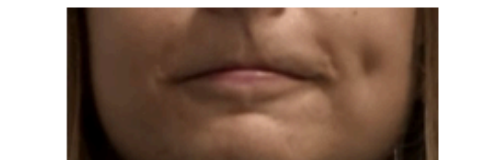
Elevación del labio superior
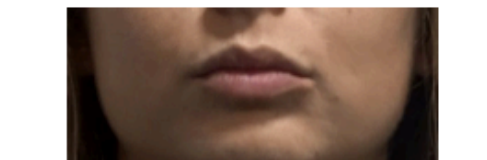
Acentuación del pliegue naso labial
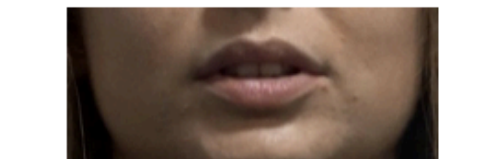
Acentuación o inflar las mejillas
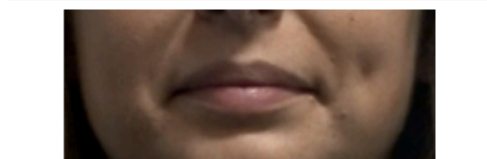
Retracción del labio y estrechamiento de las comisuras

Contracción de los labios

Apretar labios

Separación de los labios

No es:

Elevación en las cejas internas

Elevación externa de las cejas

Depresión del ángulo medio de las cejas

Bajar las cejas

F.2. INTEROBSERVER TEST

After the trainning, interobservers realized a test with 20 images (7 smiling, and 13 not smiling responses, from Ekman, Friesen, & Hager, 2002). All interobservers scored above 90%. Example of the facial expressions used in the test (answers above the images did not appear for the participants):

NOT SMILE   SMILE   NOT SMILE   NOT SMILE