

INTERBEHAVIORAL INTERPRETATION OF THE LIKERT SCALE AND FACTOR ANALYSIS

INTERPRETACIÓN INTERCONDUCTUAL DE LA ESCALA LIKERT Y EL ANÁLISIS FACTORIAL

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Abstract

This paper conceptualizes Likert-type scales from the perspective of interbehavioral psychology, analyzing the functional interaction between the participant and the instrument, and how this interaction can influence the interpretation of the results. In addition, we discuss a common psychometric method, factor analysis, highlighting that its interpretation can be influenced by assuming internal causes of behavior. It is declared that psychometrics, with respect to its application to Likert scales and factor analysis, can better articulate with interbehavioral psychology to constrain mentalistic approaches that limit the naturalistic understanding of behavior. In this sense, it is asserted that interbehavioral psychology would offer a useful starting point for improving the quality of psychological research without simplifying it only to the most widely used psychometric tools.

Keywords: Likert scale, factor analysis, interbehavioral psychology, metaphysical dualism

Resumen

Este escrito conceptualiza las escalas tipo Likert desde la perspectiva de la psicología interconductual, analizando la interacción funcional entre el/ la participante y el instrumento, y cómo esta interacción puede influir la interpretación de los resultados. Además, se discute un método psicométrico común, el análisis factorial, subrayando que su interpretación puede ser influida asumiendo causas internas de la conducta. Se afirma aquí que la psicometría, con relación a su aplicación de las escalas Likert y el análisis factorial, puede integrarse mejor con la psicología interconductual para impedir los enfoques mentalistas que limitan la comprensión naturalista de la conducta. En este sentido, se plantea que la psicología interconductual ofrecería un punto de partida valioso para mejorar la calidad de la investigación psicológica sin simplificarla únicamente al uso de las herramientas psicométricas más ampliamente utilizadas.

Palabras clave: Escala Likert, análisis factorial, psicología interconductual, dualismo metafísico

Introduction

This conceptual paper presents arguments in favor of psychometric methodology as well as the one used by interbehavioral psychology. The psychometric methodology provides generalizability and reliability; it collects data from large groups of subjects and allows for comparisons across them. For instance, administering an intelligence test or an anxiety scale to a cohort of students enables the identification of differences and general patterns. In contrast, the interbehavioral methodology offers depth and contextualization, as it relies on the observation of each subject under specific conditions. For example, observing how a student solves a problem in a laboratory setting -recording pauses, errors, and strategies- allows for an understanding of individual behavior in context. Although

this is a controversial topic, we maintain that both methodologies are compatible and complementary, as they leverage each other's strengths, integrating generalizability and depth in a productive synergy that enriches psychological research (Ferrando & Anguiano-Carrasco, 2010; Viladrich, 1991).

For decades, a significant amount of research has been conducted in psychology on the validation and adaptation of Likert-type scales using factor analysis. Furthermore, the use of such scales as methodological resources for data collection has been intensified (Carretero-Dios & Pérez, 2007). However, the use of these scales can become strained with a dualistic approach, which assumes that behind manifest behaviors there are internal or non-visible entities that cause them (e.g., personality, attitude, motivation, etc.). Psychology is a natural science that seeks objective explanations of human behavior, therefore, the dualism between the internal and the external could, in part, debate with this position of psychology (Pérez-Álvarez, 2018). It's worth clarifying that not all questionnaires aim to measure hidden aspects; there are also open-ended items that can be interpreted from different perspectives, such as the cognitive (analyzing strategies and thought processes), the interbehavioral (observing behavior in context), the humanistic (considering experiences and motivations), or the sociocultural (taking into account environmental norms and values).

Therefore, this paper proposes an effort to reconceptualize the inferences made, particularly the conclusion in factor analysis about "unobservable constructs" which "generate" the correlations between items. We also analyze, using concepts from interbehavioral psychology, the interactive process that occurs between the Likert-type scale and the participant who answers it. As Fryling and Hayes (2010) point out, regarding the

advancement of science according to Kantor (1959), this progress is also achieved because of the reconceptualization of the findings, through a naturalistic perspective in psychology, particularly, through interbehaviorism.

On one hand, to describe the complex interactive process between the Likert-type scale and the person answering it, we take as a framework, in part, Kantor's (1977) conceptualization of linguistic behavior, as well as the approach to language as behavior proposed by Ribes-Iñesta (1990), from which we interpret the idea of referential substitute behavior as a form of functional mediation in line with the interbehavioral perspective. We also consider the contributions of Ribes-Iñesta and López (1985) regarding the functional taxonomy of behavior. On the other hand, to try to partially reconceptualize factor analysis (Thomson, 2004), we rely on the theoretical approaches of interbehavioral psychology (Kantor & Smith, 1975) and the concept of interactive style of personality (Ribes-Iñesta, 2009). Therefore, this work conceptualizes Likert-type scales from the perspective of interbehavioral psychology, describing the functional interaction between the participant and the instrument, and reflecting on psychometric interpretations, such as factor analysis, which assume internal constructs as causes of behavior.

For readers who are unfamiliar with interbehavioral psychology, especially those researchers trained in psychometrics, we first present the basic concepts of this approach (events and constructs), to understand both the reinterpretation of the Likert scale and the reflection on factor analysis that will be developed later from this perspective.

Events and constructs in science

The interbehavioral approach has attempted to establish a distinction between event and construct. Both Kantor (1957) and Smith (2007), as well as Fryling and Hayes (2009), have written articles on this topic, because the confusion between the two concepts, which occurs among both laypeople and psychology researchers, has hindered and continues to hinder the advancement of psychology as a science. Throughout this paper, we will explain how the psychological event is understood within interbehaviorism, and how this notion differs greatly from the psychological constructs used in more traditional approaches of psychology. For example, when administering an anxiety test, classical psychology interprets the score as a reflection of the internal construct of anxiety. In contrast, interbehaviorism observes the student's behavior while responding -such as pauses, errors, or strategies- analyzing observable behavior without assuming causal internal entities.

Psychological event

A psychological event (PE) is defined as a behavioral field or segment of a necessarily temporal nature within the uninterrupted flow of interaction between the organism and environmental stimulation, comprised of a set of participating elements of equal importance, leaving behind unidirectional and dualistic causal thinking. Each behavioral segment is interconnected with both a preceding and a subsequent field, along a timeline. Figure 1 presents an illustration/diagram of the psychological event reproduced from Blasco Blasco (1994, p. 66), and Table 1 presents a description of each of the components (C) that form the psychological event. It is worth mentioning that Kantor (1959, p. 169) summarized the psychological event and its components in the following formula: $PE = C(k, SF, RF, IH, c, CM)$. Later, Smith (2006, p. 88) suggested adding *oe* and *r* to the formula.

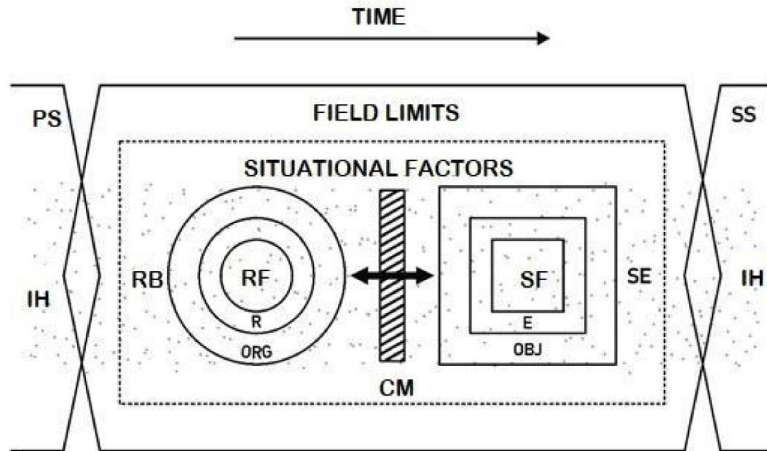


Figure 1. Behavioral segment, reproduced from Blasco-Blasco (1994)

Note: PS = Present segment; IH = Interbehavioral history; RB = Reactive biography; RF = Response function; R = Response; ORG = Organism; CM = Contact medium; SF = Stimulus function; S = Stimulation; OBJ = Object; SE = Stimulus evolution; SS = Subsequent segment (Taken from Kantor & Smith, 1975).

To illustrate, a practical example is presented showing how each component of the behavioral segment is observed in a child building a sand tower. For example, Marcos (ORG), a 7-year-old, decides to build a sand tower on the beach (OBJ). His previous experiences making sandcastles and towers (IH, RB) influence how he responds now (PS). During the activity, he chooses to stack sand using a technique he has already learned (R, RF). His mother provides guidance and demonstrates how to compact the sand (S, SF) through direct interaction (CM). Juan adjusts his strategy based on the stability of the tower and the advice received (SE), ultimately achieving a stable and complete tower (SS).

Table 1. *Components of the psychological event*

Component	Description
C	Referring to the fact that the components within the field are closely interrelated, depending on each other.
k.	Denotes that each interbehavioral field is necessarily singular and unique.
SF	The stimulus function is a property acquired by a given stimulus object that occurs in conjunction with a certain response function of the organism.
RF	The response function is a property acquired by a given organism, which happens to be interrelated with a certain stimulus function.
hi.	Refers to the total number of interactions between an organism and a stimulus object. It comprises the reactive biography and the evolution of the stimulus.
br.	The repertoire or behavioral equipment acquired by the organism throughout its life cycle in interaction with the stimulation of its successive and uninterrupted environments.
ee.	This term refers to the dynamic changes acquired by the stimulus object in interaction with an organism that responds in varied and adaptive ways to the stimulus object.
c.	This symbol denotes the context or dispositional elements that facilitate or inhibit a given interaction, which may be intrinsic to the organism or within its immediate environment.
mc.	The contact medium is the property of the environment that facilitates the interaction between the responding organism and the environmental stimulus. For example, appropriate lighting is required so we can grasp the objects we need.
oe.	The stimulus object is the part of the world that is psychologically indifferent to us; it has no psychological meaning for us yet, because a historical interaction that confers on the object a stimulus function linked to a response has not yet been established. For example, for many years in one of the authors' life, hamburgers were stimulus objects that left him unfazed; he had no predilection for them. Thanks to his sons, he started as an amateur of this exquisite food; that is, by meeting them and enjoying them, these stimulus objects gradually acquired the stimulus function of wanting to acquire and consume them.
r	It is an explicit or implicit activity (the latter only detectable by the person performing it) that has not yet acquired the response function that closely links it to a stimulus function. In the case of the first author's enjoyment of hamburgers, there was a time when his responses to buying and consuming them did not constitute a response function to the stimulus function that such food acquired with successive interactions.

To illustrate how the components of the psychological event presented in Table 1 are manifested in a concrete case, let us consider Fabriany and her trajectory with the piano. From an early age, Fabriany exhibited curiosity toward the piano, and the combination of her intrinsic interest and her sister's guidance generated a learning interaction (C.). Each learning experience was unique and singular, as the specific interaction between Fabriany and her sister did not recur with any other family member (k.). At the age of seven, her sister taught her a few notes, and it became evident that Fabriany learned at a remarkable pace (SF.), subsequently beginning to execute the notes accurately and with enthusiasm (RF.).

All practice sessions with her sister and her exploration of the piano constitute her initial interaction history (hi.), while the skills she developed over the years -coordination, musical literacy, and pianistic technique- comprise her behavioral repertoire (br.). During this stage, the piano produced varying sounds depending on how Fabriany adjusted force and rhythm, reflecting the evolution of the stimulus (ee.), and contextual factors, such as the instrument's arrangement and familial motivation, facilitated learning (c.).

Her hands, the pedal, the musical score, and communication with her sister constituted the contact medium that enabled interaction (mc.), whereas the piano, initially an object of curiosity without defined function, acquired significance as a learning stimulus (oe.).

Years later, Fabriany became a prestigious piano teacher, guiding her students with dedication and confidence, integrating her accumulated experience (r.).

Construct

While in the basic position of interbehaviorism a psychological event is something that happens in this world and is publicly verifiable, whether in discrete or continuous terms (for example, a dialogue between mother and child, with the father being the one who witnesses the occurrence of the event), the construct, on the other hand, is a concept that is usually offered to account for the occurrence of the event.

We humans use constructs to give meaning to our existence, to represent the reality we live in, and to do so, it is very useful to make these representations synthetically in a way that with one or very few words, we can label the occurrence of the events we experience. Continuing with the previous example, the father can exemplify that the dialogue between mother and son is a product of the reciprocal affection that unites them. Reciprocal affection “explains” why mother and son talk. The construct “reciprocal affection” arises from the father's observation of the conversation between mother and son.

Using this construct as a synthesis of the set of observable interactions that occur in the events is easier and more practical than describing each of these interactions (“the mother said ‘handsome’ to her son”, “the son hugged his mother upon hearing that”, etc.). However, in psychology there are many constructs that do not arise from the observation of the events they attempt to account for, and they abound, being uncritically accepted by both laypeople and researchers. Sometimes, they have been imported from other scientific disciplines to be imposed as “explanations” for psychological events. For example, Freud popularized the concept of “force” from physics in psychology; Piaget popularized the concepts of “assimilation” and “accommodation” from biology. From psychoanalytic

theory we can mention many other constructs unrelated to the observation of the phenomena they seek to explain, such as “unconscious”, “penis envy”, “libido”, “Oedipus complex”, and a long etcetera. From the computational sciences, cognitive psychology has imposed “information processing”, neuropsychology argues that the brain produces psychological behavior.

Nunnally (1991) establishes that, although the construct is a complex variable due to its abstract nature, it constitutes a hypothesis formulated due to the synthetic capacity of language. This author also argues that it makes no sense to question the very nature of a construct (whether its existence is real or merely imagined by the researcher). This would involve trying to investigate what tangible elements constitute an explanation. This position, however, contrasts with the interbehavioral view, which emphasizes the need for clear conceptual analyses in science.

The Likert scale: An interbehavioral conceptualization

Since psychological events are observable behavioral segments and constructs are synthetic representations of these events, there arises a need for tools that allow for systematic measurement and evaluation of behavior. From an interbehavioral perspective, the Likert Scale proves suitable, as it translates observed interactions into ordered scores while preserving the relationship between organism and stimulus. This reinterpretation does not aim to provide a causal explanation of behavior, but rather offers a practical means to represent the intensity or frequency of observable events.

The Likert scale is an instrument composed of phrases that refer to various aspects, such as situations, people, non-human beings, cultural products or divine entities, with several pre-established options so that those who answer it select only one per item (Croasmun & Ostrom, 2011). An example

of a scale would be one that measures attitudes towards globalization, its phrases and options to answer it would be the following: “Globalization generates prosperity in nations”. Options: 5- “Of course it does”, 4- “Yes, it does”, 3- “It seems so”, - ““It does not seem so”, 1- “No”, and 0- “Of course not”. It would be assumed that the higher the rating, the more favorable the attitude toward globalization. Basically, the degree of such attitude is the result of the quantitative accumulation of the value of each option selected for the phrases, sentences, or items by each participant. But what do we mean by the concept of attitude? Traditionally, it has been defined as a psychological disposition or tendency to act, in terms of an evaluation, for or against something or someone (Eagly & Chaiken, 1993; Reid, 2015; Rhine, 1958). This trend includes evaluation as a cognitive component but also encompasses affective aspects and the experience derived from contact with the inanimate and social world. Likewise, attitudes are multivariate, including a group of beliefs interrelated in complex ways (Reid & Amanat, 2020).

In terms of interbehavioral psychology, it would be the repeated interaction over time between the stimulus function exerted by a situation, person, plant, non-human life or even a product of the civilization or divinity in which one believes, as well as the cognitive and/or affective response function presented by a person.

However, in the scales, the phrases indirectly represent the aspect about which we want to find out how the individual would react if faced. For example, a participant responds to a survey item that states, “The warehouse staff attended to me with kindness and patience.” The statement functions as a stimulus, evoking memories and evaluations of similar experiences. The participant’s cognitive and affective response may include feelings of

being valued, satisfied, or comfortable, and is reflected in the score they assign on the Likert scale, thereby providing a measurable representation of the interaction between stimulus and response.

The Likert scale was designed by the American organizational psychologist Rensis Likert (1903-1981) to obtain direct information from people who answered a series of questions about certain aspects, such as products or services and their satisfaction with or acceptance by consumers regarding them. The Likert scale uses a sentence about an event and typically provides five options for the person to self-rate the mentioned event (Likert, 1932). Basically, in terms of interbehavioral psychology, we deal with referential substitution behavior (Ribes-Iñesta, 1990), "...the ability to see the same object in two different ways, according to the meaning it has in two different situations" (González-Becerra & Ortiz, 2014, p. 12).

This is because, from an interbehavioral psychology perspective, objects do not possess a fixed meaning; rather, their function varies according to the interaction in which they participate. In a direct situation, they act as stimuli that elicit responses, whereas in a situation mediated by language, the same object functions as a referent within verbal behavior. From this perspective, a single object may assume different functions depending on the context or the role of the organism. For example, in a Likert-type survey on customer service, the item "The warehouse staff attended to me with kindness" functions as an object of evaluation. For the participant in the role of referor, the item represents an opportunity to express their experience through a verbal response, whereas in the role of referent, it functions as a stimulus that evokes memories and emotions associated with the service received. Thus, the same object is "perceived" in two ways: as

a stimulus that elicits cognitive and affective responses, and as a verbal medium that enables the expression of such evaluation.

When an individual responds to a Likert-type scale, they simultaneously assume these two roles, that of referor and referent. In this way, the items operate as signs that substitute for the referent, that is, the object upon which the response is constructed. This interpretation is framed within the notion of referential substitution behavior (Kantor, 1977). In this sense, from the naturalistic approach of interbehavioral psychology, there is a stimulus-response function in the behavioral segment or field in which the participant answers each item.

This concept of stimulus-response function is indissoluble and integrates the stimulation of a certain part of the individual's environment (the text of each item, which using Kantor's terms [1959], we would conceptualize as substitute stimulation) and a certain consummatory activity of the subject (answering each item by selecting one of the options). In fact, according to Kantor (1980), this simultaneous and indissoluble integration between the stimulus function and the response function within a multi-component field is the true object of study of psychology. To understand the complex interaction between the sign (item text) and the referrer (the person answering the scale), that is, the interactive psychological process that occurs when a person answers a Likert scale, we can turn to the concept of substitutive functional contingency, according to the taxonomy of Ribes-Iñesta and López (1985).

This concept refers to how an object or event can function as a substitute for another within an interaction, generating responses equivalent in function, that is, fulfilling the same purpose or effect, although not necessarily

identical in form. For example, trying a new food, such as a hamburger, may replace the experience of another similar dish, eliciting comparable sensations of enjoyment; some individuals smile, while others comment, “How delicious!” (different forms expressing the same function). This relationship depends on context, interaction history, and the roles assumed, and occurs within an interbehavioral field with multiple components. Analogously, in a Likert scale, the item functions as a substitute for the actual experience, evoking the participant’s cognitive and affective responses.

Likewise, Ribes-Iñesta and López (1985) considered that the interactive style is a dispositional factor within a field of multiple components. The most accepted definition of interactive personality styles is the one that refers to a description of the stability of individual behavior exhibited in different contexts and moments, derived from the individuation process that occurs through the reactive biography and the evolution of stimulus objects (Merchán-Moya et al., 2021; Ribes-Iñesta, 2018).

The currently established classification of interactive styles is as follows (1) risk, (2) decision, (3) frustration, (4) ambiguity, (5) persistence, (6) conflict, (7) distraction and (8) scrutiny (Merchán-Moya et al., 2021). On the other hand, the evaluation of attitudes using the Likert-type scale does not “close” the contingencies (Merchán-Moya et al., 2021), it is an open contingency because it is not a subject to achievement criteria specified in advance (Ribes-Iñesta & Martínez, 2019). The interactive personality style necessarily entails a consistent behavioral pattern of the individual, displayed across different situations, according to his or her history of interaction with them. Contingency emphasizes the process of behavioral change based on certain circumstances. In short, the interactive personality

style does not reflect a fixed “individual” but rather how they tend to behave in certain types of situations. Contingency reports how an individual is behaving at a given time under certain conditions.

The participant’s interaction styles affect how they respond to Likert scale items, altering the way they express their experience without changing the meaning of the item.

We will exemplify the above, and its interbehavioral description, with the case of the Likert scale created to measure the optimistic interactive style (García-Cadena et al., 2021), where these authors defined optimism “... as an interactive style of personality...that arises from the complex, but positive historical and current relationship of the individual with their physical environment, with others and with themselves” (García-Cadena et al., 2016, p. 23). The scale consists of four items, made of the following texts: 1- “Life is beautiful”, 2- “Life is ugly”,

3- “Life is good” and 4- “Human beings are good”. In short, three texts refer to supposed attributes of life (beautiful, good and ugly), while the fourth alludes to a hypothetical characteristic of the human being (goodness). The four texts functionally substitute for the participant’s experiences, both past and present, with life and human beings in general. This is evidenced by the response options for each text: “Of course yes”, “Yes”, “It seems so”, “It does not seem so”, “No”, and “Of course not”. Before responding to the text of a given item, its symbolic content operates as a stimulus function, triggering the attentional response system, which acts as a stimulus object for the following perceptual type response system, which is followed in the same process by the phase of the evaluative reaction system and finally the consummatory reaction system would occur, which would fully close

this entire reaction pattern, specifically when the person selects one of the options offered for the text of the item. The attentional, perceptual, and evaluative response systems are precursors to the consummatory response system. The content of each item acts as a stimulus function, necessarily linked to the response function, identified by the selected option. Meaning that the stimulus-response function is configured in the relationship between the content of the item and the selected option, which we artificially and arbitrarily separate into a stimulus function on the one hand and a response function on the other, for illustrative purposes, but which occur in close communion.

The similarities between participants in such stimulus-response functions come from the fact that they are part of a similar cultural matrix (Kantor, 1982). That is, they share and have socially shared a set of cultural values, norms and practices, which leads to the texts of the items constituting, in conjunction with the participants' response to them, the similar stimulus-response function mentioned above. In this sense, the study of individual differences is possible due to the distinct interbehavioral histories, configured, in turn, by the evolution of the stimulus and the reactive biography of each person, which occur simultaneously in the uninterrupted process of adaptation to the successive circumstances that the individual experiences.

Interbehavioral conceptualization of factor analysis

With responses from multiple participants on Likert scales, there arises a need to organize and interpret the data coherently. Each item is not merely a statement but a point of interaction between the stimulus it represents and the participant's cognitive and affective response, modulated by their interaction style.

Factor analysis thus emerges as a key tool for revealing patterns in these responses, grouping items that elicit similar reactions and showing how different stimuli can produce equivalent effects on behavior.

From the perspective of interbehavioral psychology, this technique does not aim to identify hypothetical internal entities but rather to understand how stimuli and responses relate within a multi-component field, integrating the information obtained through Likert scales into a structured and functional view of behavioral patterns. This establishes a framework for analyzing how these principles are reflected in the interbehavioral conception of behavior and the explained variance of the items.

According to Kantor (1958), psychology as a science studies the relationship between the organism's response and the stimulation of environmental objects, within a field of multiple components that we can recognize as context or situations. Consequently, the explained variance of the item is reconceptualized interbehaviorally: the explained variance, understood as the fluctuation of responses to the item, is attributed to the interactive style, a dispositional factor of the interbehavioral field, which influences the variability or consistency of the construct.

The correlation between the score of an item and the set of items on the scale (which is interpreted as a factor, something that is being measured, presumably what was theorized), is called factor loading. The explained variance, understood as the percentage of intra-item response variability, also derives from the correlation between the item and the factor, since it is the square of the factor loading. Consequently, in factor analysis, both the explained variances of each item and its factor loadings or structural coefficients run in parallel, in the same direction. Both are interpreted in

terms of the degree to which they are sufficiently valid “indicators” of a “latent” variable or “unobservable construct”. However, they are also interpreted in terms of how much the inferred construct influences people in responding the way they do. Here, we can once again see how discourse flows loosely from one level to another. From the empirical plane of the observable, from the texts that constitute the items and their limited responses, to the plane of the “unobservable”, to which metaphysical causal properties of influence on the person are attributed so that they act in one way or another. To avoid this metaphysical interactionism, the interactive style is proposed to replace the “unobservable construct”. The interactive style not only explains why people respond differently to items on a scale but also maintains a more direct relationship with the empirical-the text of the items and their responses-and aligns with a functional conception of verbal behavior, without resorting to hypothetical entities.

Within this framework, factor analysis procedures can be conceived as techniques that reveal response patterns in participants, rather than as methods for uncovering internal constructs. This interpretation allows for the historical positioning of factor analysis development and helps to understand how Spearman, by grouping correlations among variables, identified factors representing functional relationships in behavior.

Factor analysis was formally developed by the English psychologist Charles E. Spearman (1863-1945), who used it as a research technique to validate his theory of intelligence (Ferrando & Anguiano-Carrasco, 2010), identifying one general factor of intelligence and several specific ones (Spearman, 1904). Factor analysis is made up of several different procedures, but what they all have in common is that they are based on correlations (the linear model, the most basic of factor analysis) between observable variables,

which are grouped together due to their interrelationship and it is assumed that they comprise a factor, which is as real as the observable variables themselves.

From this perspective, although Spearman identified factors to explain intelligence, these can be understood as response patterns arising from the individual's dynamics within their context, rather than as separate internal entities. This facilitates reconceptualizing factor analysis from an empirical and functional standpoint.

One approach to factor analysis involves the belief that the factor "explains" the fluctuations in the observed variables. Since the factor is a synthesized representation of events, this interpretation would imply that the representation is the cause of what is represented. This approach is adhered to by most psychologists who conduct empirical psychometric research.

On the other hand, when using factor analysis as a validation method for Likert-type scales, correlations between participants' responses to certain items are typically conceived statistically as a phenomenon that is interpreted inferentially in a metaphysically causalist manner (behavior is due to purely internal causes) and in cryptic-dualist terms (causes are separated from the environment). This is like saying that personality is encapsulated and fixed in the individual without recognizing that it can be influenced by the environment. This phenomenon has been posited axiomatically by some authors, without any discussion, and with no one-or just a few-mentioning anything about it (Uttal, 2013). When considering the relationship between stimuli and responses, fluctuations between items should not be interpreted as effects of hypothetical factors,

but as manifestations of behavioral patterns derived from the participant's interaction with their environment. This approach allows questioning the notion of unobservable constructs and supports a critical analysis of the internal causal attribution of statistical correlations.

However, the idea that correlations (which are part of a procedure called "factor extraction," the most used being maximum likelihood) are "indicators" of the existence of an "unobservable construct" prevails. This statistical reading attributes behavior to unverifiable internal causes, emphasizing a dualistic view. It assumes that something hidden is causing the behavior, without any evidence. This, implicitly mentalistic, symbolizes what Ryle (1949) called the "ghost in the machine", now resurrected through multivariate statistical procedures.

However, despite being "unobservable", it is claimed that the construct linearly "influences" people to respond the way they do to the item texts. Likewise, substantial reification is accepted by asserting that what is being "indirectly" measured as "something" can be identified as optimism, patience, gratitude, etc. This implies a metaphysical "mind-body" interactionism (Smith, 2007). Thus, it is easily accepted that these "psychological conditions" are found within the individual, in their mind or brain.

In this regard, mentalistic and dualistic interpretations highlight the need to adopt a functional perspective, in which factors and correlations are understood as descriptions of response patterns rather than hidden internal entities. This enables a historical reinterpretation of the antecedents of factor analysis within an empirical framework consistent with interbehavioral psychology.

For a long time—for example, since the 1940s, when Burt (The Factors of the Mind) noted—it had already been observed that the “factor” or “construct” lacked psychological meaning, that it was a metaphysical vestige to attribute causal implications to it, and that the construct merely constituted the product of the logical procedures of analysis and categorization put into practice by the researcher. Thus, by integrating the interbehavioral perspective with factor analysis, it is suggested that items and their responses may reflect observable patterns, allowing interpretation to focus on the empirical and functional, rather than on hypothetical constructs.

Conclusion

First, from the perspective of interbehavioral psychology, psychological phenomena are understood as dynamic interactions between the individual and their environment. So, what does a Likert scale represent from an interbehavioral perspective? In certain cases, a Likert scale may reflect an interactive personality style (Ribes-Iñesta, 2009), understood not as a fixed internal trait, but as a dynamic form of interaction between the individual and their environment, historically configured and subject to change over time, but currently alive, unique, and typical of the individual in their relationship with certain events in the world, others, and even with themselves.

In this sense, it is possible to discuss the optimistic interactive style, the patient interactive style, the grateful interactive style, the irascible interactive style, the psychopathic interactive style, the depressive interactive style, etc. Understanding these terms not as ordinary adjectives, but as specific interbehavioral constructs that describe interactive dispositions studied and measured in the field of psychology.

In this regard, García-Cadena et al. (2024) developed a scale defining what it supposedly measured in terms of a patient interactive style, from one side considering this from the stimulus-response function in which the goal (stimulus object) that an individual seeks to achieve is integrated, and from the other side the expectation, which implies the necessary response patterns that the person puts in motion to achieve it. In colloquial terms, patience can be defined as the psychological disposition to wait as long as necessary to achieve a desired goal.

Then, considering the Likert scale, recent studies show that to achieve greater validity and reliability of the instrument for the intended measurement, between five and seven options must be used (Aybek & Toraman, 2022; Obon et al., 2025). In our study on optimism, six options were used. However, with this approximate number of options, idiosyncratic variability is generated (and, therefore, the existence of an interactive style), because with a smaller range, this possibility would be diminished. On the other hand, the coincidence in the option selected by everyone in the texts of the items, despite the wide range of selections used, can be considered a legitimate interest of cultural psychology. Part of this phenomenon is addressed in psychometrics by measuring factorial invariance (Meredith, 1993), which focuses on determining the degree to which texts mean the same or something very similar to participants, thus deriving a scale that can be used independently of sex, age, or even a different cultural group, such as nationality.

Finally, when working from an interbehavioral psychology perspective, it is advisable to conceptualize in its own terms what you want to measure, especially when validating or adapting a scale. Likewise, it is considered relevant to derive texts from this theoretical perspective, and they are

considered operationally appropriate as items that will be subject to factor analysis. Also, in the discussion section, interpret why only certain texts in the form of items were valid for measuring the interactive personality style in question and others were discarded. In other words, both Likert-type scales and their validation and/or adaptation through factor analysis are very useful for measuring interactive personality styles, as long as the theoretical definition of what is understood psychometrically as a “construct”, its operational definition, as well as the interpretation of the findings of the instrumental study (Carretero-Dios & Pérez, 2007), are governed by the naturalistic concepts of interbehavioral psychology.

From an interbehavioral perspective, Likert-type scales would be used without assuming they measure internal constructs, but rather that the responses would be interpreted as learned behaviors.

Finally, with regard to factor analysis, it would be used descriptively to identify patterns, but not to infer mental structures. We also believe that the use of these instruments can be methodologically useful in providing conceptual clarity in the formulation of psychological problems, data analysis, and the scientific interpretation of findings.

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