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The marshmallow test in context: How does the social environment influence decision-making and self-control?

El test de la golosina en contexto: ¿cómo influye el entorno social en la toma de decisiones y el autocontrol?

O teste do marshmallow em contexto: como o ambiente social influencia a tomada de decisões e o autocontrole?

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Abstract: This article proposes a discussion of psychosocial factors that influence how humans make decisions related to self-control, emphasizing how preschoolers make those decisions in delayed reward situations. To this end, it takes as a starting point the marshmallow test placed in social context, to analyze how aspects such as rationality, emotions, socioeconomic status, culture and particularly trust in others influence how decisions are made and how self-control is exercised in relation to the delay of immediate rewards to obtain, subsequently, more beneficial results.

Keywords: decision making; marshmallow test; self-control; delayed rewards; social context.

Resumen: Este artículo propone una discusión sobre los factores psicosociales que influyen en la manera en que los seres humanos toman decisiones relacionadas con el autocontrol, enfatizando en la forma en que lo hacen los niños preescolares en situaciones de postergación de recompensas. Para ello, toma como punto de partida el test de la golosina puesto en contexto social, para analizar la forma en la cual aspectos tales como la racionalidad, las emociones, la condición socioeconómica y particularmente la confianza en los demás influyen en cómo se toman decisiones y cómo se ejerce o no el autocontrol en relación con el postergar recompensas inmediatas para obtener, posteriormente, otras mayores.

Palabras clave: toma de decisiones; test de la golosina; autocontrol; postergación de recompensas; contexto social.



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Resumo: Este artigo propõe uma discussão sobre os fatores psicossociais que influenciam a maneira em que os seres humanos tomam decisões relacionadas ao autocontrole, enfatizando o que fazem as crianças pré-escolares em situações de adiamento de recompensa. Para isso, tomamos como ponto de partida o teste do marshmallow aplicado ao contexto social, para analisar a forma pela qual aspectos como a racionalidade, as emoções, a condição socioeconômica, e particularmente a confiança nos outros influenciam em como as decisões são tomadas e como se exerce ou não o autocontrole em relação ao adiamento de recompensas imediatas para obter, posteriormente, outras maiores.

Palavras-chave: tomada de decisão; teste do marshmallow; autocontrole; adiamento de recompensas; contexto social.

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This article aims at analyzing how the social environment influences the decision-making of delayed responses, putting the marshmallow test in context, for which it reviews some aspects both conceptual and empirical about the decision-making processes related to self-control. More specifically, it analyzes the way in which rationality, emotions, socioeconomic status and particularly trust in others, influence how decisions are made and how self-control is exercised or not in relation to delay immediate rewards to obtain, later, more beneficial results.

The marshmallow test

The marshmallow test experiment implies that a preschooler is offered a candy (it may be a marshmallow, a cookie, or a similar one that is tempting), but is told that if he or she wants a second treat he must wait for the experimenter to return without eating the first. More specifically, this technique consists of a boy or girl being presented with a treat and told that it is for them to keep, but that if they wait without eating it for the evaluator to return, then they will be given a second reward. After this instruction the participant is asked if she or he wants to wait, for which most children around the world to whom this experiment has been applied, decide to do so (Mischel, 2014).

The marshmallow test, apparently a simple experiment to assess personal self-control, generally applied towards the end of early childhood, has been shown to have a statistically significant predictive value on positive results at the educational level (more years of study), work (better placement), economic (better income), family (greater stability) and social (more harmonious and less conflictive relationships) in adult life (Mischel, 2014; Shoda, Mischel, & Peake, 1990). More recent replicas of the marshmallow test have found that while these predictions show statistical significance, their effect is moderate and highly sensitive to the inclusion of covariates, such as interpersonal, cultural, and socioeconomic context (Lamm et al., 2018; Michaelson & Munakata, 2016; Watts, Duncan & Quan, 2018).

When analyzing people decades after they had performed the experiment, the evidence suggests that those who had managed to wait as long as they had (approximately 15 minutes – which can vary from one methodological design to another) when they were about five years old, tended to present better results in their adult lives in various areas, which seems to point to the predictive importance of the capacity for self-control in development, and more specifically, the ability to postpone rewards to obtain more beneficial results later. This may be related to the ability to plan behavior in the long term, postponing immediate rewards, to obtain better outcomes later (Mischel, 2014).

However, recent replications of this work have come to question its predictive value and its validity as a measurement technique, given the relatively low correlations obtained between the performance in the marshmallow task and the cognitive and social results achieved subsequently, as well as the high correlations between the favorable performance of children in this task and their social environment (high socioeconomic status, living with both parents, absence of severe social conflict; Watts et al., 2018).

Social context and self-control in decision-making

Recent research (Chaverri, Conejo, León, & Arrieta, 2020; Kidd, Palmeri, & Aslin, 2013) has managed to determine that the social context in which people operate has a profound influence on how they make decisions, not only in general terms, but in specific instances and dynamics of this interaction. In this sense, it has been demonstrated that experiencing situations of scarcity, environmental instability, and the perception of living in conditions of low socioeconomic status, have direct implications on cognitive and regulatory skills in contexts of attention to immediate needs, on the ability to solve problems that involve some degree of reasoning, as well as on stress management, academic performance and eating habits (Shah, Mullainathan, & Shafir, 2012). Generally speaking, it can be said that a deprived social environment can lead people to make more impulsive decisions and be less able to consider a long-term vision.

Trust in other people

Trust involves both beliefs and emotions and is an emotional state coupled with an expectation of behavior (Thagard, 2019). Trusting another person involves believing that they are honest and having a positive feeling towards that person. In addition, Thagard (2019) proposes that trust has cerebral correlates that unite representations of the self, the other, the situation and the emotion experienced with respect to the other, in a special pattern of neuronal firing. In this sense, trusting people may involve probability estimates of how they

will behave, but in the other hand, other people are usually trusted without accurate predictions about their behaviors. From this approach, the emotional component of trust involves neural patterns that combine representations of the situation of which the emotion is about, evaluations of the relevance of the situation to the objectives of the actor, perceptions of physiological changes, and even representations of the self.

Similarly, distrust is an emotional process that goes far beyond estimating low odds of people doing what is expected of them. It also requires representation of oneself, the unreliable person, and the given situation, but differs from trust in that it involves negative emotions like aversion and fear. These emotional reactions arise from the combination of cognitive assessments about unfulfilled goals and unpleasant physiological reactions to the unreliable person. Distrusting someone is not only a prediction of unfulfilled expectation, but also an emotion about the unreliable person. In this sense, it can be said that trust is a process that involves cognition and emotion (Thagard, 2019).

In recent studies on the relationship between trust and self-control with the marshmallow test (Chaverri et al., 2020; Kidd et al., 2013), it has been interpreted that the ability to postpone the reward to obtain better results depends not only on considering the number of treats that can be received, but also on an estimate of the probability of obtaining them based on the confidence that inspires the other person. In this way, when before taking the marshmallow test, a promise to the child has been broken, it can generate both the belief that the experimenter is not reliable, and a negative feeling to this person, which would result in a reduced waiting capacity in front of the treat.

That is, the effect of reduced delayed rewards during the test of the treat would not depend only on the child representing the counterpart as someone who will not fulfill the promise of bringing a second treat, but also that this representation would be accompanied by a negative feeling towards this person, which would lead the participant to achieve a shorter time of postponement of the reward. When a child is asked to wait in exchange for a reward, the outcome depends not only on the personal ability to be able to postpone the reward, but also on what he or she thinks and feels about the person making the promise (Michaelson & Munakata, 2016). This greater self-control when one has confidence in the other person could occur because interpersonal attunement is generated, which positively influences self-regulation (Siegel, 2016). That is, trust contributes to producing interpersonal regulation, which in turn becomes greater self-regulation.

Emotions

Emotions can be understood as mental and physical processes that include aspects such as bodily responses, facial expressions, and subjective assessment (Smith & Kosslyn, 2012). Emotions cannot be separated from thought and reason when analyzing people's behavior in various situations, as emotions can be seen as triggers or inhibitors of decisions in people's lives and in turn decisions can be seen as a reflection of the way emotions guide individual attempts to override negative feelings and to increase positive ones (Smith & Kosslyn, 2012).

This vision of emotions as a guide reverses the roles that traditionally attributed this role to rationality, since they put emotion as the weighting of the information that cognition allows to capture, giving it a negative, positive, or neutral valence (Damasio, 2018). As noted by several authors who have studied the role of emotions in decision-making (Damasio,

1994; Eagleman, 2017; Todd & Gigerenzer, 2012), a person with damaged brain regions dedicated to emotional processing finds many difficulties in making decisions because, although he or she has no problem understanding the available information, they fail to evaluate it and thus obtain the emotional trigger that seems to activate the decision and the consequent action.

Contrary to what used to be thought in the past, emotions would not be a hindrance, nor an enemy of reasoning, but rather seem to play a complementary role that would serve to value the information available that, being highly sensitive to the conditions of the environment, could serve as an aid to act adaptively in that context.

In the case of the marshmallow test, emotions can be influenced by the context of trust or distrust in other people, influencing behavior and the decision to inhibit or trigger the behavior of touching or eating the treat. Studies should determine whether when children have received signs of untrustworthiness from the experimenter, this could generate negative emotions related to anger, frustration, and displeasure, which could weaken the ability to postpone the reward, in the face of an increased need to seek satisfaction when eating the treat.

Rationality

Human decision-making processes are rarely based on the rational model of decision-making in the strict sense, in which people are considered as completely objective beings and profit maximizers, with full knowledge of the options they have at their disposal to choose from and unaffected by the influence of external events or emotions (Robbins & Aydede, 2009). In the complex world in which we develop, the impossibility of processing large amounts of information, the limitations of time, energy and cognitive resources, the difficulty in classifying our preferences and the lack of certainty in the final result of our decisions, make decision-making processes surrounded by elements much more complex than those merely suggested by rational decision-making theory, among which the socioeconomic condition, culture and even parenting models that can eventually influence how we make decisions stand out (Lamm et al., 2018).

In this sense, the ecological theory of decision-making makes it possible to think about the way in which the interaction between people and their environments gives shape to the way in which they make decisions. Thus, rationality would no longer be a simple calculation of utility and probabilities of profit, but it is a complex interaction between the individual and his environment that considers various aspects of the particular situation and the broader context. So, behaving in line with the principles of classical rationality and behaving adaptively would not necessarily be the same process. A better understanding of human cognitive systems needs a more ecological view of rationality, where cognitive limitations and specific contexts are seen as significant aspects of adaptive cognition, rather than a perspective of the human being as a calculating robot adhering to the principles of classical rationality, unable to consider various particular aspects of each physical and social context (Robbins & Aydede, 2009). Undoubtedly, this line of research must be addressed by future studies in developmental sciences and education, if we intend to achieve explanatory models of the behavior of children that allow us to derive psychosocial intervention with ecological validity and social relevance.

Situated cognition

The results in the contextualized marshmallow test here referred to (Chaverri et al., 2020; Kidd et al, 2013) show that children in more reliable and stable conditions achieve better results in postponing the reward. This interaction between the child and his environment could find greater meaning from the perspective of the ecological theory of decision-making, which assumes that cognition is not a mental process isolated from the environment in which the person is, but rather it is a process in which mental activity takes advantage of the structure of the physical and social environment (Robbins & Aydede, 2009). This way of understanding cognition as something integrated into the environment is known as situated cognition, and ecological rationality can be understood as a form of situated cognition (Brighton & Todd, 2009).

Ecological rationality claims that human beings are agents that use various decision strategies in a way that is sensitive to the environment in which they are immersed. Situated cognition looks at human behavior as something socially and materially immersed, emerging within the concrete and specific details of particular environments, rather than as an abstract, disconnected, general-purpose process of logical rationalization.

Returning to the marshmallow experiment in context, while the more impulsive behavior of those who wait less time on this task can be seen as less rational from the perspective of rational decision-making theory, it could be seen as ecologically sound when before the marshmallow test the experimenter has shown signs of being unreliable, since he has broken his previous promise to bring improved materials to draw. That is, from a situated perspective, a behavior that could be classified as irrational would be seen as ecologically sound if it contributes to responding to the circumstances in which the maker finds himself. Another relevant aspect for this approach is that the shorter waiting time is also related to the socioeconomic condition of participants, which suggests that not only the immediate context of the decision, but also the context of origin, influence the experience of the person, their perception, their feelings, and their performance in the marshmallow test put into context.

The interaction between rationality and emotion

Traditionally, the decision-making literature equated rationality with maximizing the value of a potential gain (Smith & Kosslyn, 2011; Sternberg, 2011). This expected utility model was based on three basic assumptions about the person making the decision: 1) That they are fully informed about all possible choice options, 2) They are very sensitive to subtle distinctions between existing options, and 3) They are totally rational about the choice between options (Slovic, 1990).

Consistently, obtaining better results in the marshmallow test was explained from the rational theory of decision making (Mischel & Staub, 1965), based on the fact that what this experiment does is to compare a choice between a lower immediate gratification and a higher subsequent gratification, which is related to the idea of people as utility magnifying agents, typical of the rational theory of decision making, so that a higher waiting time could be explained within this theory in terms of a higher rationality.

But is it only rationality that explains the differences? According to rational decision-making theory, human beings are agents who make decisions in a utilitarian way, seeking to increase profits and reduce losses (Smith et al., 2012). However, the most recent research in

behavioral economics, psychology and cognitive neuroscience has been showing that people are, much more often than is usually assumed, not very rational decision makers (Ariely, 2010; Kahneman, 2011), if rationality is defined in the terms of the assumptions made by the expected utility model.

One line of research that puts this question into perspective is the "ultimatum game" (Jensen, Call, & Tomasello, 2007). In this game, two people, sitting opposite each other, must decide how to distribute resources given to them. For example, ten money bills of the same denomination are given to one of the players (the offeror), who must decide how to distribute them with his counterpart, being that, if the receiver rejects the deal, both players are left with nothing. On the other hand, if the receiver accepts the deal, then both players stick with what the offering player proposed (Güth, Schmittberger, & Schwarze, 1982).

Following the model of expected utility in decision-making, players should reject any offer equal to zero (because it implies not obtaining any profit) and accept any offer equal to or greater than one (because it implies improving the original situation that is zero). However, people do not act like this, since, in a distribution with a total of 10 units, they tend to reject those offers in which they are assigned two or fewer units and accept those that make them earn three units or more (Jensen et al., 2007). In addition, if the offer is given by a person, the recipient tends to a greater rejection of low offers (8:2 or 9:1) than if the offeror is a computer, in which case there is a greater acceptance of low offers. This suggests the influence of a judgment on the moral capacity of the counterparty (Fehr, 2009).

This decision-making behavior does not fit with what is expected by the rational theory, in which all offers that imply a profit should be accepted. Why does this happen? One possibility that has supporting evidence is that when people find themselves in contexts of interdependence with each other, rather than classifying offers in a merely rational and utilitarian way, a more emotional and presumably moral weighting seems to occur (Sanfey, Rilling, Aronson, Nystrom, & Cohen, 2003). This is supported by the aforementioned finding that when the offeror is a computer, there tends to be less rejection of offers than when playing with another person, which suggests a moral judgment about the intentions of the counterparty. On the other hand, when low offers are received (which would be considered unfair in an interpersonal context) there is a greater activation of brain areas associated with emotional processing (for example the right anterior insula) compared to the brain processing of information in egalitarian offers. This suggests that there is an increased role of emotion when an unequal offer is received. In addition, people with a greater activation of the right anterior insula against low offers, reject such offers in greater proportion (Sanfey et al., 2003), suggesting an interaction between this emotional processing and rejection.

In the study carried out by Sanfey et al. (2003), participants were brain scanned with functional magnetic resonance imaging during playing the ultimatum game, responding both to proposals categorized as fair (tending to 50/50 parity) and unfair (moving closer to total disparity 0/100). Unfair offers triggered activity in brain areas related to both emotion (anterior insula) and cognition (dorsolateral prefrontal cortex). This evidence suggests an important role for emotions in this decision-making.

Contrary to what the expected utility model predicts, decision-making in interpersonal contexts, far from being an exclusively utilitarian process, consists of an emotionally and morally mediated process, an idea that has been strengthened in recent years due in part to research that tries to understand the mind and human behavior within its

environment, analyzing specific interactions, as well as the role of emotions, which are not there to interrupt, distract or mislead, but are important for cognitive functions and decision-making in a contextualized way. It is important to note that there is still much to understand about these processes, and future research should explore the specific mechanisms by which emotion and cognition are intertwined in decision making process (Damasio, 2018; Todd & Gigerenzer, 2012). Given the above, it can be argued that recent research suggests that emotions, morality, and social context are important factors to consider in understanding the way people make decisions and exercise their self-control skills, without denying this the importance of cognition and reasoning, but rather recognizing the need to achieve a deeper understanding of how these elements interact with each other.

As Todd and Gigerenzer (2012) argued, the future of decision-making research should understand these interactions between the mind and its environment, expanding the focus of those social scientists more attached to the traditional theory of rational choice. From our point of view, our knowledge about the relation between decisions and emotions is rather limited, and the field needs to better understand how we develop our cognitive and emotional repertoire to make decisions, so it is necessary to strengthen research in this direction.

Conclusion

As suggested by the research reviewed here, self-control cannot be considered an independent capacity from the environment, since it is influenced by the circumstances that shape our ability to make decisions, being interpersonal trust a relevant aspect of this person-environment interaction.

When a child decides not to wait for the second marshmallow after being exposed to a deception from his or her counterpart (as occurs in the experiment reviewed here when a promise is broken), instead of judging his or her act as irrational, we should rather consider the emotional context that produces the induced distrust, to understand the way in which the child's action adapts to the structure of his or her environment, according to what is proposed by the theory of situated cognition and the theory of ecological rationality. When a person is not emotionally comfortable in a given situation, it may be appropriate to try to see what that negative emotion means in that context, rather than simply try to inhibit it by considering it "an obstacle" to reasoning.

That a person in a more insecure, unstable, and deprived context acts more impulsively and shows more difficulty in delaying a reward, could be considered an adaptive response to such characteristics of his or her context, since it could be said that experience has taught him that the promises of others and his environment cannot be trusted a priori, since he lives in an environment where they are usually broken easily, and expectations are often unfulfilled. Is this person less rational? If the interaction between the person and the environment is taken into consideration, as proposed by the theory of ecological rationality, and situated cognition, it can be seen that not waiting for the second treat can be considered an adaptive behavior in some circumstances.

When the context of a person is taken into account, it can be understood that someone who lives in a safer, more stable, and satisfactory situation, could more easily inhibit the impulses of immediate satisfaction and wait, since they can have more hope for promises to be fulfilled, because he is more accustomed to it being so. Offering community and

educational environments that strengthen the sense of stability and basic confidence of children is essential to promote their capacity for self-control, decision-making and adaptive behaviors.

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