Editorial

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Why Does Co-Occurrence Change Evaluation? Introduction to a Special Issue on Evaluative Conditioning

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A student sits in front of a computer in an experiment. On the screen, the instructions indicate that the first task in the experiment is a perceptual task. Photos will appear on the screen, and the student is requested to observe them attentively. Pairs of photos appear for a few minutes, one second for each pair. Four relatively neutral stimuli always appear with a pleasant photo and another four relatively neutral stimuli always appear with an unpleasant photo. After the perceptual task, the student observes the eight (previously) neutral stimuli again, one by one, and rates how much she likes each of the stimuli. This ends a typical experiment on the Evaluative Conditioning (EC) effect. EC has been defined as a change in the evaluation of a stimulus as a result of pairing with another stimulus (De Houwer, 2007). Although *to pair* means *put together or join to form a pair* ("Pair," n.d.), it seems that in the context of EC, pairing was used to denote only one method for joining together: the co-occurrence of two stimuli, or of two types of stimuli. A typical EC effect is assimilative: the evaluation of a previously neutral stimulus (the conditioned stimulus, CS) often becomes more similar to the valence of an affective stimulus (the unconditioned stimulus, US) with which it co-occurred (Hofmann, De Houwer, Perugini, Baeyens, & Crombez, 2010).

Narrowing the meaning of *pairing* to *co-occurrence* still leaves a vast number of instances that may qualify as EC. It is not easy to convey information about the valence of an object *without* presenting the object (or a symbolic reference to the object) in a temporal or a spatial proximity to valenced stimuli. Because exposure to information about the valence of objects probably characterizes most events that lead to evaluation change, EC is a possible contributor to most cases of evaluation change. For instance, after seeing Bob pushing Ted, the perceiver might come to dislike Bob. This could be the result of a causal inference, but also the direct result of the co-occurrence between Bob and a negative behavior, or Bob and a behavior with negative consequences, such as Ted's painful cry. In fact, it is also possible to construe causal inference not as an alternative cause of the evaluation change, but only the mediating mechanism of the effect of exposure to co-occurrence on evaluation, or as a moderator of the effect of co-occurrence on evaluation. Such conceptualizations render EC a central effect in human judgment, but also complicate the study of EC.

We view this potential ubiquity of EC as a strength, but the fact that EC applies to many instances might also be a threat if it means that EC is too general to serve as a useful target of research. To understand this point, consider the highly general effect of a change in behavior as a result of exposure to stimuli. Theoretical models that would explain the effect of exposure to stimuli on behavior would be too abstract or too complex to serve as useful tools for organizing existing knowledge and making new predictions. Is EC too general to be a useful research topic? Probably not, if you ask research labs that currently focus on investigating EC. These labs usually study variations of the simple paradigm we described at the beginning of this article. Like most contemporary experimental psychologists, the research community that studies EC believes that this simple paradigm stimulates psychological processes that people use outside the lab, when they encounter stimulus co-occurrence. The hope is that improving the understanding of the psychological processes recruited for this experimental paradigm would improve the understanding of evaluative learning in other contexts as well.

After more than forty years of EC research, much evidence has been recorded and reported. However, as alluded to above, it is not easy to think and theorize about EC. Theoretical accounts have been proposed, but many of them are vague or outdated. The referential account, one of the most cited models of EC, has never been presented formally in more than a few paragraphs in an empirical paper (Baeyens, Eelen, Crombez, & Van den Bergh, 1992). In fact, there seem to be no proponents of the referential account who still conduct EC research and use that account to explain existing findings. The same is true in the case of the holistic account (Martin & Levey, 1994), and the conceptual categorization account (Davey, 1994). The so-called propositional account (De Houwer, 2007, 2009; Mitchell, De Houwer, & Lovibond, 2009) is perhaps best considered as a perspective, or a family of models, with not even one specific model that explicitly explains why and how stimulus co-occurrence leads to EC. The Associative Propositional Model of Evaluation (APE; Gawronski & Bodenhausen, 2006, 2011, 2014) is a comprehensive theory about evaluation, and papers that presented it have not provided a full theoretical treatment of the implications of the model to the main questions in EC research.

The purpose of the present special issue was to bring into publication explicit, comprehensive contemporary theoretical accounts for EC. Because there is some tension between EC's simple definition and the possible complexity of explaining what factors determine this effect, we thought that the field would benefit from explicitly articulated theoretical perspectives about EC. We hope that these perspectives could fuel, inspire, and organize future empirical research, and help to further formulate and develop strong theories for EC and other forms of evaluative learning. We also hope that the present issue could serve as a useful guide for researchers less familiar with EC, who wish to obtain a good understanding of EC and the current theoretical treatment of this effect. With these goals in mind, we will close this introductory editorial with a short presentation of this issue's articles, using them to answer one question: why does EC occur?

Why Does EC Occur?

The least straightforward account for EC comes from the Implicit Misattribution Model (IMM; March, Olson, & Fazio, 2018, this issue). According to the IMM, one reason for EC is that, at acquisition, when perceiving the US and the CS in spatiotemporal proximity, the perceiver misattributes to the CS the affective reaction triggered by the US. According to the IMM simple co-occurrence is not sufficient to produce EC – the misattribution depends on people's ability to experience the affective response elicited by the US. Interestingly, although misattribution only requires unawareness of the source of affect, whereas all the rest of the process can occur deliberately and with awareness, the IMM posits that the whole attribution process is implicit and occurs without intention and awareness. The result of the implicit misattribution process is the formation of a memory link between the CS and the evaluative response to the US. Later, this memory link leads to the automatic activation of the evaluative response toward the CS. Based on the MODE model (Fazio & Olson, 2014), the IMM assumes that the automatic evaluative reaction would influence deliberate evaluation, as long as the person is not motivated or does not have the opportunity to deliberately revise this reaction.

March et al. (2018, this issue) state that the IMM is one of many mechanisms that probably contribute to EC. Two other mechanisms are proposed within the APE (Gawronski & Bodenhausen, 2018, this issue). The first mechanism is associative: observing spatio-temporal contiguities between the CS and the US leads to the formation of mental links between the CS and the US, or directly between the CS and the evaluative reaction to the US. These mental links result in the activation of the evaluative reaction typical to the US when encountering the CS. Just like the IMM, the APE assumes that this activation comes in the form of automatic evaluation of the CS. Thus, the APE allows for a completely associative mechanism for EC, in encoding and expression, probably quite similar to the mechanism most people have in mind when they first hear about EC. Associative processes are mental processes that include only mental representations of associations – links between two concepts (e.g., the CS and the US valence), with no representation of the specific relation between the concepts (e.g., *co-occur*) and with no representation of the validity of the relation (whether the relation is perceived as true or false).

Like the IMM, the APE assumes that automatic evaluation can also influence deliberate evaluation. In the case of the APE, the prediction is that deliberate evaluation would be the same as the automatic evaluation, unless deliberate reasoning processes conclude that automatic evaluation is incompatible with other information stored about the CS. When evaluation is deliberate, the process is no longer completely associative because deliberate evaluation involves reasoning and inference based on propositions. Unlike associations, propositions are mental representations that code specific relations between concepts, as well as truth-values of those relations. Propositions are essential for reasoning and inference.

Propositions are the central characteristic of the other mechanism for EC, derived from the APE, namely, propositional learning. At encoding, people store the observed relation between the CS and the US and the validity of this relation. When observing the CS-US co-occurrence, the relation might be *CS co-occurs with US*, and it would typically be judged as valid. If people infer from that relation that the US valence characterizes the CS, deliberate evaluation of the CS would reflect that conclusion. Further, the conclusion would form mental associations between the CS and the US, leading to an automatic evaluation of the CS with the US valence.

The APE does not specify why (or if) the relation *CS co-occurs with US* leads to the inference that the US valence characterized the CS. According to De Houwer (2018, this issue), the answer to that question is complex because people consider the CS-US co-occurrence a problem to be solved in order to make sense of their environment and guide their behavior. Therefore, only a detailed model of problem solving could explain how people make sense of CS-US co-occurrence and the many factors that might moderate that sense making. We will note here that perhaps the challenge in the case of EC is manageable. Problem solving is highly complex partly because people make sense of a wide array of events. But CS-US co-occurrence is only one class of events. It is indeed probable that CS-US co-occurrence elicits an endless number of inferences and chains of inferences. Yet, it is not unthinkable that the two, three, or four most frequent inferences cover the majority of inferences people usually make based on a CS-US co-occurrence. If that is the case, it does not seem impossible to find what exact inferences typically lead to an effect of CS-US co-occurrence on the evaluation of the CS.

In his contribution, De Houwer (2018, this issue) defines propositional models of EC as a class of models that share the hypothesis that EC occurs *only* after a mental representation of a proposition has been formed about the relation between the CS and the US or between the CS and the evaluative response to the US. Thus, a propositional model could adopt the mechanism of propositional learning proposed by the APE model (Gawronski &

Bodenhausen, 2018, this issue), but it must reject the possibility of the associative learning mechanism proposed by the APE, and reject the implicit misattribution mechanism proposed by the IMM (March et al., 2018, this issue).

In the present issue, De Houwer (2018, this issue) goes beyond the definition of the class of propositional models, and proposes the first propositional model – the integrated propositional model (IPM) of EC. According to the IPM, for EC to occur, the CS-US co-occurrence must lead not only to the proposition that the CS and the US co-occur, but also to the mental representation of an evaluative proposition about the valence of the CS (e.g., *the CS is good*). The evaluative response occurs as a result of the representation of the evaluative proposition in working memory (WM). The evaluative proposition reaches WM for the first time as a result of an inference process. Later, it can be stored in the LTM, and retrieved again into WM by similarity-based retrieval (i.e., due to retrieval cues that overlap with the proposition, such as the occurrence of the CS in an attitude questionnaire).

Although the IPM does not commit to specific inferences that lead to the formation of evaluative propositions from a co-occurrence proposition, De Houwer (2018, this issue) provides one possible scenario that could help understand the logic behind the propositional mechanism for EC. When noticing that a CS co-occurs with a US, the mental representation of that relation can be integrated in WM with the proposition *similar stimuli tend to co-occur*, a belief retrieved from the LTM. The inference from the integration of these two propositions is the proposition that the CS is similar to the US, leading to the evaluative proposition that the US valence characterizes the CS. That evaluative proposition can be stored in LTM and retrieved later in the rating task. When retrieved and represented in WM, it would lead to an evaluative response that reflects that proposition. Such a scenario assumes a chain of inferences that lead from CS-US co-occurrence to the evaluative response to the CS later on. Although such a sequence of inferences is potentially endless, De Houwer's account seems to open new avenues of research that would track, for example, the minimal number of inferences needed for the EC to occur or types of inferences that facilitate / inhibit the EC effect.

With much similarity to the APE, a set of three hypotheses named *Simple First* (SF, Bar-Anan & Moran, 2018, this issue) explains EC as the result of a spread of activation processes and inference processes. SF treats EC as one subclass of the effect of linking a stimulus to valence. According to SF, co-occurrence is only one of many events that expose people to the information that a concept (the CS) is related to positive or to negative valence. In those events, the encoding process that requires the least cognitive effort is the storage of the mental representation of the information that the concept and the valence are linked. With a little more cognitive effort, specific relations between concepts (*how* they are linked) are also stored. With even more effort, at acquisition, inference processes are deployed and produce new relations (e.g., the relation *CS is positive* inferred from the information that the CS co-occurred with positive stimuli and that similar stimuli tend to co-occur). The new relations are subjected to the same encoding processes: little cognitive effort is required for the storage of links between the concepts included in the inferred relation, more effort is required for storing the inferred relation between the concepts, and even more effort leads to further inference. In other words, CS-US co-occurrence is most likely to form a memory link between the CS and the US features (including its valence), but can also elicit inference processes that could lead to further formation of mental links between the CS and the valence included in the inferred relations.

Like the IMM and the APE, SF posits that at the expression phase, when the CS is encountered, a spread of activation process translates the valence linked to the CS to an automatic evaluative response compatible with the linked valence (e.g., a positive response if the linked valence is positive). Upon deliberate evaluation, inference processes can retrieve the relational information and make an inference about the evaluation of the CS. That is very similar to the propositional process described by the APE. One difference between SF and the APE is that SF does not make assumptions about the mental representation of the information that the CS is linked to valence. SF would be unaffected by the assumption that the mental representation is propositional (e.g., *CS is linked to positive*). A more important difference between SF and the APE, in their account for EC, is that SF explicitly assumes that the inference processes include the inference that the valence activated by the spread of activation process characterizes the CS. That is, SF assumes that people consider their automatic evaluative response indication that the CS, at least to some extent, is characterized by the valence of the automatic evaluation response. Whereas the APE assumes that people reject the automatic evaluation when it is in conflict with other information considered by the deliberative reasoning process, SF assumes that people treat automatic evaluation as valid evidence. Other evidence might have a stronger influence on deliberate evaluation, but, even in that case, the automatic evaluation would still have an attenuating effect on the final evaluation. In other words, according to SF, mental links between the CS and valence always have an assimilative effect on the evaluation of the CS, even when conflicting evidence pushes the evaluation to the opposite direction. Therefore, whenever CS-US co-occurrence leads to the encoding of information that links the CS to the US, an assimilative effect of the US valence on the CS would occur. Because of that, even the encoding of the evaluatively neutral information *CS co-occurs with positive stimuli* would lead to an assimilative effect of the US on the evaluation of the CS.

SF does not explain what specific cognitive processes translate exposure to CS-US co-occurrence into a mental representation of a link between the mental representation of the CS and the mental representation of the US. According to the APE, the formation of mental CS-US links is the result of the Hebbian principle of *fire together, wire together* (Hebb, 1949), but the APE does not provide further details. A more detailed account for the encoding stage is proposed in the current issue by Walther, Halbeisen, and Blask (2018, this issue), who argue that the encoding necessary for EC involves the binding of CS features and US features (including evaluative response) into one memory unit. That memory unit is an event-file, hypothesized by the theory of event coding (Hommel, Müsseler, Aschersleben, & Prinz, 2001), reflecting an integration of relatively abstract representations of stimuli and actions. Relying on feature integration theory (Treisman & Gelade, 1980), Walther et al. (2018) suggest that selective attention to specific features determines what features bind together. For EC to occur, acquisition must facilitate selective processing of CS and US features in accordance with the perceiver's current goals.

Walther et al. (2018, this issue) argue that EC involves well-studied binding processes that can help researchers understand this effect. Similarly, two contributions in the present issue (Gast, 2018, this issue; Stahl & Aust, 2018, this issue) suggest that EC can be understood, to a large extent, through the well-studied processes of memory: encoding, maintenance, and retrieval. The reasoning is incontrovertible: exposure to CS-US co-occurrence must lead to the storage of new memories that are later retrieved and contribute to the evaluation. Gast (2018, this issue) proposes the Declarative Memory Model (DMM) of EC, positing that EC is often the result of the formation of a memory trace that links the CS to evaluative information from the US, which survives in memory the duration between acquisition and expression, is retrieved *consciously* when the CS is being evaluated, and is used in the CS evaluation. Although the model does not cover in detail the judgmental aspect of EC—what exact information needs to be stored in memory for influencing judgment, and how that memory influences judgment—the rest is, indeed, comprised only of memory processes. Therefore, the DMM is well-suited for providing a highly accurate and useful model for EC. Further, in her contribution, Gast (2018, this issue) provides a cogent analysis of a good number of factors that might determine whether the retrieval of memory traces encoded at exposure to CS-US co-occurrence would influence evaluative judgment.

Based on the same incontrovertible ideas that begot the DMM, Stahl and Aust (2018, this issue) propose using MINERVA 2 (Hintzman, 1984), an existing model for episodic memory, as a model that, along with many findings from research on memory, can explain EC. Stahl and Aust are particularly interested in using memory research and theory as an alternative for dual process accounts for EC, mainly the APE. Stahl and Aust propose that EC is the result of a single encoding process that stores the learning instances into declarative episodic memory. These memory traces later inform evaluative judgment. They attribute findings of discrepancy between different measures of what was learned to different retrieval cues of contexts, rather than to two different systems or learning mechanisms. Similarly, Stahl and Aust propose making predictions about awareness during learning (an issue that has always received much empirical attention) based on existing knowledge about the effects of bottom-up factors (stimulus strength) and top-down processes (goals and attention) on encoding. In their article, Stahl and Aust cover many important questions in EC, and show how each of them can be informed by existing knowledge about memory processes.

To the best of our understanding, Stahl and Aust (2018, this issue) do not propose a detailed mechanism for the specific translation of memory retrieval to judgment. A judgment task involves more than retrieval of information. For instance, in order to judge whether one acquaintance is taller than another, retrieval of their figures is not enough, some process of comparison must occur. Similarly, evaluative judgment does not end in retrieval (unless one retrieves the result of a previous judgment process). If people retrieve the US valence when encountering the CS, they can answer the question *which valence co-occurred with the CS?* but it is not certain that the US valence would also be the answer to the question *do you like the CS?* or *what valence characterizes the CS*? Therefore, like the DMM, it seems to us that Stahl and Aust's model might be highly informative for answering many (if not all) questions about EC, but most often, only after integration with a judgment model. If the integration is as simple as using the retrieved US valence as the output of the CS judgment process, then indeed the memory models explain EC in full. If judgment is more complex, memory models might be essential but not sufficient for explaining EC.

The final contribution to this special issue is a comprehensive summary and initial theoretical treatment of an effect that is even broader than EC: attribute conditioning (AC). Unkelbach and Förderer (2018, this issue) summarize research about the less-studied finding that not only mere liking or disliking spreads from the US to the CS, but also more specific attributes of the US, such as human traits, and physical features (e.g., softness and size). In other words, after CS-US co-occurrence, people tend to judge the CS as resembling the US in attributes other than valence. It is reasonable to assume that favorability judgment (i.e., evaluation) is not completely different, on the functional and the mental level, from other judgments. Positivity and negativity are attributes, and even if they are the most important attributes (Osgood & Suci, 1955), it stands to reason that information processing systems (such as the human brain) would use similar processes, algorithms, and physical hardware (structures in the brain) to process valence and other attributes. If that is indeed the case, research and theory about AC could add valuable knowledge about EC, and vice versa.

Final Comments

Taken together, the theories presented in this Special Issue are focused on explaining why a simple co-occurrence of stimuli in the environment frequently produces changes in people's evaluative responses. To the best of our knowledge, the contributors to this Special Issue cover all currently existing theoretical accounts of EC. The authors showed tremendous effort to explicate their accounts in as much detail as possible. The outcome, this Special Issue, provides the academic community a comprehensive source of knowledge about the current state-of-the-art in the field of affective learning. As can be seen across all papers, the researchers studying EC sometimes take quite different perspectives on its mechanisms and on the factors influencing how people learn and express evaluations. Some of the theories are compatible (at least in some aspects) with each other, whereas others seem to differ substantially. We believe that aside from separate heuristic values of each of those models, the differences between them will drive new empirical efforts directed at a better understanding of how people learn affective responses. We therefore pass this material to the readers in the hope that it will prove useful in moving the field forward.

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References

Bar-Anan, Y., & Moran, T. (2018). Simple first: A skeleton for an evaluative learning model. *Social Psychological Bulletin*, *13*(3), Article e28761. https://doi.org/10.5964/spb.v13i3.28761

Baeyens, F., Eelen, P., Crombez, G., & Van den Bergh, O. (1992). Human evaluative conditioning: Acquisition trials, presentation schedule, evaluative style and contingency awareness. *Behaviour Research and Therapy*, *30*(2), 133–142. https://doi.org/10.1016/0005-7967(92)90136-5

Davey, G. C. L. (1994). Defining the important theoretical questions to ask about evaluative conditioning: A reply to Martin and Levey (1994). *Behaviour Research and Therapy*, *32*(3), 307–310. https://doi.org/10.1016/0005-7967(94)90126-0

De Houwer, J. (2007). A conceptual and theoretical analysis of evaluative conditioning. *The Spanish Journal of Psychology*, *10*(2), 230–241. https://doi.org/10.1017/S1138741600006491

De Houwer, J. (2009). The propositional approach to associative learning as an alternative for association formation models. *Learning & Behavior*, *37*(1), 1–20. https://doi.org/10.3758/LB.37.1.1

De Houwer, J. (2018). Propositional models of evaluative conditioning. *Social Psychological Bulletin*, *13*(3), Article e28046. https://doi.org/10.5964/spb.v13i3.28046

Hofmann, W., De Houwer, J., Perugini, M., Baeyens, F., & Crombez, G. (2010). Evaluative conditioning in humans: A meta-analysis. *Psychological Bulletin*, *136*(3), 390–421. https://doi.org/10.1037/a0018916

Fazio, R. H., & Olson, M. A. (2014). The MODE model: Attitude-behavior processes as a function of motivation and opportunity. In J. W. Sherman, B. Gawronski, & Y. Trope (Eds.), *Dual process theories of the social mind* (pp. 155–171). New York, NY, USA: Guilford Press

Gast, A. (2018). A declarative memory model of evaluative conditioning. *Social Psychological Bulletin*, *13*(3), Article e28590. https://doi.org/10.5964/spb.v13i3.28590

Gawronski, B., & Bodenhausen, G. V. (2006). Associative and propositional processes in evaluation: An integrative review of implicit and explicit attitude change. *Psychological Bulletin*, *132*(5), 692–731. https://doi.org/10.1037/0033-2909.132.5.692

Gawronski, B., & Bodenhausen, G. V. (2011). The associative–propositional evaluation model: Theory, evidence, and open questions. *Advances in Experimental Social Psychology*, *44*, 59–127. https://doi.org/10.1016/B978-0-12-385522-0.00002-0

Gawronski, B., & Bodenhausen, G. V. (2014). The associative-propositional evaluation model: Operating principles and operating conditions of evaluation. In J. W. Sherman, B. Gawronski, & Y. Trope (Eds.), *Dual-process theories of the social mind* (pp. 188–203). New York, NY, USA: Guilford Press.

Gawronski, B., & Bodenhausen, G. V. (2018). Evaluative conditioning from the perspective of the associative-propositional evaluation model. *Social Psychological Bulletin*, *13*(3), Article e28024. https://doi.org/10.5964/spb.v13i3.28024

Hebb, D. O. (1949). *The organization of behavior*. New York, USA: Wiley & Sons.

Hintzman, D. L. (1984). MINERVA 2: A simulation model of human memory. *Behavior Research Methods, Instruments, & Computers*, *16*(2), 96–101. https://doi.org/10.3758/BF03202365

Hommel, B., Müsseler, J., Aschersleben, G., & Prinz, W. (2001). The Theory of Event Coding (TEC): A framework for perception and action planning. *Behavioral and Brain Sciences*, *24*(5), 849–878. https://doi.org/10.1017/S0140525X01000103

March, D. S., Olson, M. A., & Fazio, R. H. (2018). The implicit misattribution model of evaluative conditioning. *Social Psychological Bulletin*, *13*(3), Article e27574. https://doi.org/10.5964/spb.v13i3.27574

Martin, I., & Levey, A. B. (1994). The evaluative response: Primitive but necessary. *Behaviour Research and Therapy*, *32*(3), 301–305. https://doi.org/10.1016/0005-7967(94)90125-2

Mitchell, C. J., De Houwer, J., & Lovibond, P. F. (2009). The propositional nature of human associative learning. *Behavioral and Brain Sciences*, *32*(2), 183–198. https://doi.org/10.1017/S0140525X09000855

Osgood, C. E., & Suci, G. J. (1955). Factor analysis of meaning. *Journal of Experimental Psychology*, *50*(5), 325–338. https://doi.org/10.1037/h0043965

Pair. (n.d.). In *Oxford Living Dictionaries*. Retrieved from https://en.oxforddictionaries.com/definition/pair

Stahl, C., & Aust, F. (2018). Evaluative conditioning as memory-based judgment. *Social Psychological Bulletin*, *13*(3), Article e28589. https://doi.org/10.5964/spb.v13i3.28589

Treisman, A. M., & Gelade, G. (1980). A feature-integration theory of attention. *Cognitive Psychology*, *12*(1), 97–136. https://doi.org/10.1016/0010-0285(80)90005-5

Unkelbach, C., & Förderer, S. (2018). A model of attribute conditioning. *Social Psychological Bulletin*, *13*(3), Article e28568. https://doi.org/10.5964/spb.v13i3.28568

Walther, E., Halbeisen, G., & Blask, K. (2018). What you feel is what you see: A binding perspective on evaluative conditioning. *Social Psychological Bulletin*, *13*(3), Article e27551. https://doi.org/10.5964/spb.v13i3.27551

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