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When increased confidence yields increased thought: A confidence-matching hypothesis

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Abstract

Traditional theories of confidence and information processing suggest that people engage in greater processing activity when they feel doubtful as opposed to confident. Recent research, however, has hinted at the possibility that this effect might be malleable. The current research tests a confidence-matching hypothesis to determine when increased confidence yields increased processing and when increased confidence yields decreased processing. Based on recent advances in research on matching effects, it is proposed that the classic negative effect of confidence on information processing will reverse when messages are framed in terms of confidence. This hypothesis is tested by presenting participants with a persuasive message containing strong or weak arguments under confidence or doubt conditions. As predicted, when the message is framed in confidence terms, participants engage in greater message processing when they feel confident rather than doubtful, as indicated by greater argument quality effects on attitudes and thought favorability.

Psychological confidence—the general existential state of certainty or uncertainty—is a fundamental aspect of human judgment and thought (e.g., Kruglanski, 1989, 1990; Petty, Briñol, Tormala, & Wegener, in press). Considering the role of confidence has expanded knowledge in a wide range of domains, including attitudes (e.g., Gross, Holtz, & Miller, 1995), the self (e.g., Wright, 2001), memory (e.g., Busey, Tunnicliff, Loftus, & Loftus, 2000), impression formation (e.g., Yzerbyt, Schadron, Leyens, & Rocher, 1994), stereotyping (e.g., Sechrist & Stangor, 2001), decision making (e.g., Kahneman, Slovic, & Tversky, 1982), and subjective cognitive experience (e.g., Tormala, Petty, & Briñol, 2002).

Of greatest relevance to the present concerns, considerable evidence suggests that general feelings of confidence have implications for information processing. The traditional finding in this area is that the less confident people feel, the more they process information. For example, people tend to engage in greater information processing when they are chronically low rather than high in certainty (e.g., Weary & Jacobson, 1997). In one demonstration, Edwards (2003) presented people who were high or low in causal uncertainty (Weary & Edwards, 1994) with a persuasive message containing strong or weak arguments. Discriminating between strong and weak arguments is a well-established indicator of processing such that greater processing is associated with greater argument quality effects (Petty & Cacioppo, 1986). Edwards found that attitudes were more influenced by argument quality when individuals were high rather than low in casual uncertainty.

Situational inductions of uncertainty have also been shown to induce greater processing. Tiedens and Linton (2001), for example, examined the relationship between specific emotions and feelings of certainty. They noted that some emotions (e.g., anger) were associated with certainty, whereas other emotions (e.g., fear) were associated with uncertainty. Using several different paradigms they found that people engaged in greater processing when induced

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to feel emotions associated with low rather than high certainty.

The typical explanation for these effects has been that when people feel certain, or confident, they interpret that feeling as suggesting that they already have sufficient knowledge, eliminating the need for further processing. When people feel doubt, they presumably infer that they lack sufficient knowledge, and systematic information processing is one means of obtaining knowledge and establishing certainty. This notion is consistent with the assumptions of dual-process theories of attitude change. The sufficiency principle of the Heuristic Systematic Model (Chaiken, Liberman, & Eagly, 1989), for instance, suggests that when actual judgmental confidence falls short of desired confidence, people will process deeply to bridge that gap, as long as they have the cognitive resources to do so (Bohner, Rank, Reinhard, Einwiller, & Erb, 1998; Maheswaran & Chaiken, 1991).

Reversing the classic effect of confidence on processing

In contrast to the traditional line of thought that confidence reduces processing relative to doubt, the present research asks whether feeling confident might sometimes *increase* processing activity. Based on past research, there is reason to suspect such a reversal might be possible. Albarracín and Mitchell (2004), for example, explored the role of defensive confidence in determining people's willingness to process threatening information. They found that people high in defensive confidence—meaning they believed their attitudes could withstand attack—were more willing to process counterattitudinal information than were people low in defensive confidence. Ironically, this openness to processing also produced more attitude change among people high rather than low in defensive confidence.

Similarly, Olson and Zanna (1979) examined the relation between an individual difference and preference for proattitudinal versus counterattitudinal information. They used the Revised Repression–Sensitization Scale (Byrne, 1964) to identify individuals who were either approach-minded (sensitizers) or avoidance-minded (repressors), and they asked them to choose one from a number of paintings to keep for themselves. After deciding, participants were given an opportunity to inspect the paintings. Sensitizers were more willing to attend to the unselected (presumably counterattitudinal) alternatives than were repressors. Assuming greater confidence among people who are generally approach- rather than avoidance-minded, this finding suggests that confidence can be associated with an increased tendency to engage in objective processing.

Finally, recent directions in self-affirmation research suggest that affirming people before presenting persuasive messages can affect the level of message scrutiny in which people engage. For instance, Correll, Spencer, and Zanna (2004) exposed participants to a self-affirmation induction and then presented a series of persuasive arguments. For important attitudes, affirmed participants were more sensitive than non-affirmed participants to differences in argument quality, suggesting deeper processing levels for affirmed compared to non-affirmed individuals (see also Harris & Napper, 2005). Assuming that self-affirmation affects self-confidence (see Sherman & Cohen, 2006), this finding further suggests that increased confidence might yield increased processing.

A confidence-matching hypothesis

The primary aim of the current research is to test a new perspective on confidence and information processing that establishes conditions under which confidence decreases processing relative to doubt as well as conditions under which confidence increases processing relative to doubt. We predict that although there may be a default tendency for confidence to reduce processing compared to doubt, this effect might reverse when information is framed in terms of confidence—meaning that information is thought to be related to or about some aspect of confidence or achieving confidence. We base this prediction on recent advances in research on matching effects in social judgment.

It is now well-documented that when information is framed in a way that matches people's personal characteristics or psychological states, they will expend greater effort processing that information. In one demonstration, Wheeler, Petty, and Bizer (2005) presented individuals high or low in need for cognition (Cacioppo & Petty, 1982) with a strong or weak persuasive message framed to appeal to high (e.g., "When you think about it, it's the only choice!") or low (e.g., "No need to think twice!") need for cognition. Wheeler et al. found that both high and low need for cognition individuals showed greater processing (i.e., argument quality effects) when the message framing matched rather than mismatched their level of need for cognition. This result resonates with findings from a number of other domains. For example, matching message frames to people's attitude functions (Petty & Wegener, 1998), approach-avoidance orientations (Updegraff, Sherman, Luyster, & Mann, 2007), self-guides (Evans & Petty, 2003), and social identities (Mackie, Worth, & Asuncion, 1990) has been shown to augment information processing activity (see also Ottati, Rhoads, & Graesser, 1999; Petty, Wheeler, & Bizer, 2000).

Why does matching affect processing? The typical explanation for this effect has been that matched messages are perceived as more personally relevant than mismatched messages (e.g., DeBono & Packer, 1991; Evans & Petty, 2003; Petty & Wegener, 1998; Updegraff et al., 2007; Wheeler et al., 2005) and personal relevance, in turn, boosts message processing (Petty & Cacioppo, 1979). Indeed, if one receives a message that matches one's characteristics or psychological state, that message likely is perceived as speaking more directly to the kind of person one is, the kind of interests one has, or the current feelings one is experiencing. If one receives a mismatched message, that

message might be perceived as uninteresting, irrelevant, or even alienating (Ottati et al., 1999).

We seek to apply this logic to the study of confidence and processing. As a starting point, we assume that when people feel confident or doubtful, they can be aware of their status along this dimension. That is, people can have some metacognitive awareness of their current level of confidence versus doubt (see Petty et al., in press). To the extent that people can perceive their own confidence, the influence of confidence on processing might depend on message framing. In particular, it could be that when a message is framed in terms of confidence, people perceive that message as more personally relevant when they feel confident rather than doubtful due to the perceived match between their psychological state and the message frame. If true, we would expect to observe greater processing of confidence-framed messages when people feel confident rather than doubtful.

The present experiment

The present experiment was designed to test this hypothesis. Participants were presented with a persuasive message promoting a fictitious policy. Some participants received a confidence frame for this message, whereas others received no frame. To manipulate confidence versus doubt, we used a priming induction in which participants were asked to recall experiences in which they felt confident or doubtful. To assess processing, we manipulated the quality of the arguments in the persuasive message. We expected that in the no frame condition we would obtain the traditional effect of confidence on processing—greater processing (i.e., argument quality effects) under doubt rather than confidence conditions. When we framed the message in confidence terms, we expected to find the opposite effect—greater processing (i.e., argument quality effects) under confidence rather than doubt conditions.

It is worth noting that in addition to testing a new conceptual perspective on the effects of confidence on processing, the present experiment also provided a more direct test of the positive effect of confidence on processing than has been provided in past studies. Although some past research has been suggestive of a positive association between confidence and processing, as noted, this effect has yet to be demonstrated in an experiment that both directly manipulates confidence and directly assesses actual levels of processing. It seems reasonable to surmise that confidence was varied in the self-affirmation (e.g., Correll et al., 2004) and repression–sensitization (Olson & Zanna, 1979) studies, for instance, but neither repression–sensitization differences nor self-affirmation manipulations have been established as affecting confidence in past research. In their work on defensive confidence, Albarracín and Mitchell (2004) did measure and directly manipulate confidence, but in none of their studies did they assess the actual extent of processing in which participants engaged. They focused on information *selection*—that is, whether participants chose to (and did) expose themselves to proattitudinal versus counterattitudinal information. Thus, they assessed the type rather than amount of information processed. We conducted a more direct test of the confidence-processing link in the current experiment.

Method

Participants and design

One hundred eighty Indiana University (IU) undergraduates took part in exchange for partial credit in their Introductory Psychology courses. Participants were randomly assigned to conditions in a 2 (Prime: confidence or doubt) × 2 (Message Frame: confidence frame or no frame) × 2 (Argument Quality: strong or weak) between-participants factorial design.

Procedure and manipulations

Participants were seated at personal computers in a room containing seven partitioned work stations. The opening screen of the experiment led participants to believe they would be participating in two separate studies during the session. In the first study, which ostensibly concerned autobiographical memory, confidence or doubt was induced using a procedure adapted from Petty, Briñol, and Tormala (2002). Specifically, participants were instructed to describe five experiences they had in which they felt confident or doubtful. The instructions were as follows (manipulated words are in parentheses):

> . . .we would like you to list 5 experiences you have had in which you felt a great deal of confidence or certainty (doubt or uncertainty). These experiences could reflect confidence (doubt) in thoughts you have had, confidence (doubt) in decisions or predictions you've made, or even confidence (doubt) in your general ability to do something. In each of the 5 boxes that appear on the next several screens, please describe a different experience in which you felt highly confident (doubtful) about something.

After describing their experiences, participants were led into the second study, which ostensibly was designed to investigate students' perceptions of a new policy under consideration at their university. Specifically, participants were led to believe their university's Board of Trustees was considering implementing a new comprehensive exam policy (see Petty & Cacioppo, 1986). This policy would require seniors to pass a series of comprehensive tests in their major areas before graduation. We set the policy for five years in the future to make it moderately relevant to participants. Following this basic background information, participants were randomly assigned to the confidence frame condition or the no frame condition. In the *confidence frame* condition, participants learned that they would

receive a message about comprehensive exams that was intended to build confidence. Specifically, participants read the following passage:

> The Board of Trustees' message has been prepared with the specific intention of removing students' doubts and restoring confidence in the educational process at IU. The Board hopes that by engaging students in this process, students will become more confident that they understand campus policy and other issues.

In the *no frame* condition, participants simply learned that they would receive a message about comprehensive exams; no reference was made to confidence or doubt.

At this point, all participants received a persuasive message in favor of comprehensive exams. In the *strong argument* condition, this message contained arguments that were strong and convincing (e.g., comprehensive exams would improve the quality of undergraduate teaching and education). In the *weak argument* condition, this message contained arguments that were weak and unconvincing (e.g., comprehensive exams would motivate students through anxiety and fear). All arguments were adapted from past research (Petty & Cacioppo, 1986).

After reading the message, participants reported their attitudes toward the policy. Participants then were instructed to list the thoughts they had about comprehensive exams as they were reading the message. Ten boxes were provided for participants' individual thoughts, appearing one at a time on the computer screen. Participants were instructed to list as many thoughts as they wanted, making sure to capture the main idea of each thought before continuing to the next one (see Cacioppo & Petty, 1982). Once they had completed the thought listing task, participants were thanked, probed for suspicion, and then fully debriefed with respect to the deception and the aims of the research.

Dependent measures

Attitudes

Participants rated comprehensive exams on semantic differential scales ranging from 1 to 9 with the following anchors: *negative–positive*, *bad–good*, *against-in favor*, *harmful-beneficial*. Responses to these items were highly consistent ($\alpha = .92$), so they were averaged to form a composite index. Higher numbers indicated more favorable attitudes.

Thought favorability

Two judges, blind to experimental conditions and hypotheses, coded participants' thoughts for favorability. Each thought was coded as positive, negative, or neutral with respect to comprehensive exams or the message. The judges' ratings matched on 94% of the thoughts listed, and disagreements were resolved through discussion. To form an index of thought favorability for each participant, we subtracted the number of negative thoughts from the number of positive thoughts and divided this difference by the total number of thoughts. Thus, higher numbers indicated a greater proportion of positive relative to negative thoughts.

Results

Attitudes

The attitude data (see Table 1) were submitted to a $2 \times 2 \times 2$ ANOVA with prime, message framing, and argument quality as the independent variables. Only two significant effects emerged from this analysis. First, there was a main effect for argument quality, $F\ (1,\ 172) = 21.30$, $p < .001$; attitudes were more favorable following strong ($M = 6.22$) rather than weak ($M = 5.05$) arguments. As predicted, though, this main effect was qualified by a significant three-way interaction, $F\ (1,\ 172) = 10.97$, $p = .001$. No other effects from this analysis approached significance, Fs < 1.36, ps $> .24$.

Of greatest importance, the three-way interaction involved two two-way interactions of opposite patterns. In the no frame condition, there was a significant prime × argument quality interaction, $F\ (1,\ 87) = 4.60$, $p < .04$, reflecting a significant argument quality effect in the doubt prime condition, $F\ (1,\ 87) = 16.79$, $p < .001$, but not in the confidence prime condition, $F\ (1,\ 87) = .96$, $p > .33$. In the confidence frame condition, there was also a significant prime × argument quality interaction, $F\ (1,\ 85) = 6.66$, $p < .02$, but in this case it assumed the opposite form. That is, there was a significant argument quality effect in the confidence prime condition, F (1,

Table 1
Attitudes and thought favorability as a function of prime, message framing, and argument quality

Dependent measure	Doubt prime		Confidence prime	
	Argument quality			
	Weak	Strong	Weak	Strong
	No frame			
Attitudes				
M	4.48	6.61	5.64	6.17
SE	.36	.37	.37	.39
Thought favorability				
M	−.52	.10	−.21	−.16
SE	.14	.15	.15	.15
Sample size	24	23	23	21
	Confidence frame			
Attitudes				
M	5.58	5.70	4.50	6.33
SE	.33	.34	.34	.32
Thought favorability				
M	−.26	−.17	−.52	.13
SE	.15	.15	.15	.14
Sample size	23	21	21	24

85) = 15.53, $p < .001$, but not in the doubt prime condition, F (1, 85) = .07, $p > .78$.

Thought favorability

The thought data (see Table 1) were submitted to the same 2 × 2 × 2 ANOVA. The outcome paralleled the attitude results. That is, there was a main effect for argument quality, F (1, 172) = 11.21, $p < .001$, and a significant three-way interaction, F (1, 172) = 7.38, $p < .01$. No other effects approached significance, Fs < 1. Decomposing the interaction, we found two two-way interactions of opposite patterns. In the no frame condition, there was a significant prime × argument quality interaction, F (1, 87) = 3.90, $p = .05$, involving an argument quality effect in the doubt prime condition, F (1, 87) = 9.27, $p < .01$, but not in the confidence prime condition, F (1, 87) = .04, $p > .84$. In the confidence frame condition, there was a marginally significant prime × argument quality interaction, F (1, 85) = 3.49, $p < .07$, which assumed the opposite form. In this case, there was an argument quality effect in the confidence prime condition, F (1, 85) = 9.53, $p < .01$, but not in the doubt prime condition, F (1, 85) = .18, $p > .67$.

Mediation

To determine if participants' cognitive responses were responsible for the attitude effects, we conducted a test of mediated moderation. To begin with, we reexamined the attitude and thought favorability data using a series of hierarchical regression analyses. As already noted, there was a significant prime × frame × argument quality interaction (controlling for main effects and all two-way interactions) on both attitudes, $\beta = .63$, t (172) = 3.31, $p = .001$, and thought favorability, $\beta = .54$, t (172) = 2.72, $p < .01$. There was also a significant relation between attitudes and thought favorability, $\beta = .68$, t (178) = 12.22, $p < .001$. When both the three-way interaction term (controlling for main effects and two-way interactions) and thought favorability were entered in a regression equation, predicting attitudes, thought favorability remained a significant predictor of attitudes, $\beta = .61$, t (171) = 10.80, $p < .001$. The prime × frame × argument quality interaction term continued to predict attitudes, but this effect was attenuated, $\beta = .30$, t (171) = 2.00, $p < .05$. Furthermore, a Sobel test indicated significant mediation of the attitude effect through thought favorability ($z = 2.14$, $p < .04$).

Discussion

The traditional perspective on confidence and processing has been that people process information more extensively when they are in a chronic or temporary state of doubt rather than confidence (e.g., Chaiken et al., 1989). Of importance, though, other work has hinted at the opposite possibility (e.g., Albarracín & Mitchell, 2004; Correll et al., 2004). In the present research, we tested a new theoretical perspective predicting both when a state of confidence might increase processing and when a state of confidence might decrease processing. In so doing, we also provided more direct empirical evidence for the notion that confidence can increase processing relative to doubt than has been provided in past research.

In accord with recent work on matching effects in persuasion (e.g., Wheeler et al., 2005), we proposed a confidence-matching hypothesis suggesting that when a message was framed in confidence terms, confidence would increase processing relative to doubt. The results of our experiment were consistent with this hypothesis. Using a direct manipulation of confidence versus doubt and a well-established indicator of processing (argument quality effects on attitudes and thoughts) we replicated the traditional negative effect of confidence on processing in the no frame condition. When the persuasive message was framed in confidence terms, however, this effect was reversed; that is, confidence increased processing relative to doubt. Moreover, the attitude effects were mediated by the favorability of participants' thoughts, further highlighting the role of information processing in the current effects. Although the mediated moderation approach we employed did not directly test the specific conditions under which thoughts did and did not mediate attitudes, the overall pattern of evidence suggests that when argument quality affected thoughts, it also affected attitudes; when argument quality failed to affect thoughts, it also failed to affect attitudes.

In short, the present research provides the first simultaneous demonstration that confidence can both increase and decrease processing, with the direction of this effect depending on message framing. Again, feeling confident produces thoughtful processing when information is framed in a way that matches that feeling. Consistent with past research on matching (e.g., DeBono & Packer, 1991), our interpretation of this effect is that when people feel confident and the message they receive is described as providing confidence, that message feels more personally relevant or more attuned to one's current feelings and interests (see also Ottati et al., 1999). This perceived relevance, in turn, sparks more elaborative processing (Petty & Cacioppo, 1979). Although this account for our findings is preliminary, it resonates with prior research on matching effects and provides a parsimonious explanation of the present effects.

Interestingly, administering the confidence frame in our experiment appeared to wipe out processing for doubtful individuals. This finding might seem counterintuitive given that people experiencing doubt presumably want to restore confidence and a confidence-framed message would seem particularly capable of doing so if processed. There are several possible explanations for the reduced processing among doubtful individuals in the confidence frame condition. First, as suggested by prior matching theories, it could be that when people feel doubtful, a message framed in confidence terms seems less personally relevant because it mismatches people's current psychological state. As a second

possibility, the confidence framing itself may have restored confidence for doubtful individuals. After all, participants in the doubt condition presumably felt doubtful when they got to the message framing portion of the experiment. Perhaps learning that the message they were about to read was specifically designed to provide confidence sufficed to boost confidence in a cue-based fashion, reducing the need to process further. Also interesting, it could be that when doubtful individuals encountered the confidence frame, they were caught between two conflicting goals: not processing a mismatched message versus processing information that reduces uncertainty. Less processing in this condition could reflect frustration or cognitive load experienced by these individuals as a result of having conflicting objectives (e.g., see Lewin, 1951; Shah & Kruglanski, 2002). Alternatively, perhaps the matching motive simply overrides the uncertainty reduction motive in this scenario. For now, the resolution to these issues awaits future studies.

Remaining questions

A self-affirmation explanation? As reviewed earlier, recent directions in self-affirmation research are generally consistent with the current findings if one assumes that affirmation can affect self-confidence, which to our knowledge has never been directly tested (see Sherman & Cohen, 2006). From this perspective, it is worth addressing one potential alternative explanation for our results. Specifically, some might argue that our manipulation of confidence paralleled self-affirmation manipulations from past studies. The argument would be that generating a list of experiences in which one felt confident has an affirming effect on the self-concept, which increases information processing. If true, might self-affirmation play a role in the present results?

Although it may be tempting to attribute our processing effects to self-affirmation mechanisms, we think several pieces of evidence work against this account. For example, the self-affirmation account would predict an argument quality effect in the confidence prime/no frame condition, which was not obtained. Although it appears that participants were slightly more favorable following strong than weak arguments in this condition, the effect did not approach significance, as indicated earlier. Furthermore, the cognitive response data revealed that thought favorability was virtually identical across strong and weak arguments in this condition. Perhaps one could argue that the confidence frame adds to the affirmation induction (in the confidence prime/confidence frame condition), thus providing a second round of affirmation that finally sparks processing. The data in the doubt prime condition, however, contradict this position. Indeed, in the doubt prime/no frame condition, in which participants presumably would feel non-affirmed according to the self-affirmation perspective, the argument quality effect was robust on both attitudes and thoughts. Adding a confidence frame, which presumably would have an affirming effect, *eliminated* processing among these individuals. Thus, although self-affirmation provides an interesting explanation at first blush, the overall pattern of data is not compatible with a self-affirmation interpretation. Ultimately, though, the most direct and compelling way to eliminate affirmation as an explanation for the current effects would be to conduct a study in which affirmation is manipulated independently of confidence as it has been operationalized in our research. We see this as a useful direction for future study.

Moderating factors? We view the present research as providing an initial foray into understanding the more complex role of confidence in information processing. In future research, it would be useful to examine potential moderators of the present effects. For instance, one interesting question would be what happens under doubt frame conditions—that is, situations in which people learn that a particular message is designed to remove confidence and create doubt. According to a strict matching account, a doubt frame would increase and decrease processing among doubtful and confident people, respectively. However, it could also be that people respond to doubt framing differently than they respond to confidence framing. Perhaps people feeling doubt would not process a doubt-framed message as that would risk worsening their epistemic problem. In fact, assuming people are motivated to feel or hold at least some moderate degree of confidence (e.g., Chaiken et al., 1989; Kruglanski, 1989) it could be that doubt-framed messages would be avoided by both confident and doubtful individuals. Disentangling these possibilities by including doubt frames in future research would provide a useful test of the boundary conditions on the current effects.

It may also prove interesting to investigate individual difference moderators. For example, might individual differences in the need for closure (Kruglanski & Webster, 1996) moderate the present effects? One possibility is that high need for closure individuals would be most susceptible to the effects of confidence matching on processing. Low need for closure individuals might be more willing to process information regardless of their level of confidence or doubt, whereas high need for closure individuals might be reluctant to engage in extensive processing but prompted to do so by confidence matching. Conversely, it could be that high need for closure individuals are so concerned with reaching quick decisions that they resist extensive processing irrespective of the message frame and their feeling of confidence or doubt. Perhaps low need for closure individuals would be more attuned to situational factors that determine whether processing is necessary or warranted and, thus, would be more influenced by confidence matching. Addressing this and other individual difference moderators in future work would expand our understanding of the current issues.

Conclusion

Securing and maintaining confidence is one of life's great epistemic goals. Considerable past research has revealed that when people have less confidence than they desire they are highly motivated to process information, presumably in

the interest of restoring confidence (e.g., Chaiken et al., 1989). In combination with other recent research, our confidence-matching hypothesis suggests that the effect of confidence on processing is malleable. In fact, the present experiment indicates that under specifiable conditions, this effect can be completely reversed such that confidence fosters greater processing than does doubt. Thus, this research expands current understandings of the effects of confidence versus doubt on information processing. We hope that our findings will stimulate further inquiry of the more complex nature of confidence effects in social judgment and thought.

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