The dynamics of surprise and curiosity

Noordewier, M.K.

Epilogue

The dynamics of surprise and curiosity

"The mind is an anticipatory device"
Miceli and Castelfranchi (2015; p. 3)

People constantly monitor whether reality fits their schematic representations and expectancies (e.g., Botvinick et al., 2001, Miceli & Castelfranchi, 2015). When an unexpected event is detected or when information appears to be missing, people experience surprise or curiosity (Loewenstein, 1994; Meyer et al., 1997; Silvia & Kashdan, 2009). At this point, reality does not yet make sense, which is unpleasant because it is in conflict with people's need for a predictable and coherent world (Gawronski & Strack, 2012; Miceli & Castelfranchi, 2015; Proulx et al., 2012). This unpleasantness is, however, only

temporary, as people will try to make sense of the unknown and anticipate that they can resolve their lack of understanding. Following these dynamics of sense-making, I argued and showed that the subjective experience of surprise and curiosity depends on where people are in their process of dealing with the unknown.

Part 1: Surprise

The first part of this dissertation focused on surprise. Based on the temporal dynamics of sense-making, I theorized in Chapter 1 that responses to surprising events are dynamic and unfold from initial interruption (i.e., responses to the unexpectedness of an event) to cognitive mastering (i.e., responses to the valence of the event). I showed that theories and empirical evidence on surprise could be arranged onto this interruption-to-mastering timeline: Initially, surprise increases processing depth to prepare cognitive mastering. The interruption is likely to be experienced as negative and over time, responses unfold to other states depending on the nature of the stimulus. Time is thus a key factor to understand the nature of surprise and to distinguish it from its consequences.

In Chapters 2 and 3, I presented empirical support for this unfolding logic of surprise. In Chapter 2, I used autobiographical recall procedures and analyses of facial expressions over time and found that the response to a surprising event and the perception of surprise in others is initially more negative than later. This is replicated in Chapter 3, where I showed that initial facial expressions to positive surprises are more negative than later expressions. Moreover, expressions to positive

and negative surprises were initially similar, but after time differentiated depending on the valence of the event. Finally, people may frown after a surprise and importantly, initial frowns were independent of the valence of the surprising target and only later turned to smiles in the case of positive surprises.

Taken together, Part 1 of this dissertation showed that to study surprise it is key to take the temporal dynamics of sense-making into account and to distinguish surprise from the state that follows it. Facial expressions are particularly suitable to reveal this unfolding, because they can capture these temporal changes.

Part 2: Curiosity

In Part 2, I focused on the dynamics of curiosity. Curiosity is the desire to know (Litman, 2005; Loewenstein, 1994; Silvia & Kashdan, 2009) and contrary to the "undecided" nature of surprise where people await further information before taking action (Scherer et al., 2004), curiosity involves exploratory motivation aimed at resolving the information-gap. In this context, time is also a key factor. Like surprise, curiosity also involves unfolding from not knowing something to knowing something. Yet, while with surprise time allows people to make sense of what has happened, with curiosity, the outcome that resolves the state is not present yet and the anticipation of finding it or being able to deal with it is the key factor. I showed that the anticipation of discovering the outcome weakens the negativity of being deprived of information. In addition, I showed that the anticipation of

being able to deal with something that is not completely understood intensifies interest.

Specifically, in Chapter 4, I showed that time to the resolution of curiosity affects the subjective experience of curiosity because it determines the relative impact of not knowing vs. almost knowing what an outcome will be. When people did not expect to close their information-gap soon (long time-to-resolution), the anticipation of the resolution was weaker and not knowing affected the subjective experience of curiosity more strongly than when they expected to close their information-gap quickly (short time-to-resolution). As such, people experienced less positive affect, more discomfort, and more annoyance with lack of information when the time-to-the-resolution was long as compared to short. Moreover, when time in the long time-to-resolution situation passed, the anticipation of the resolution became stronger, positive affect increased, and discomfort and annoyance with lack of information decreased.

Finally, in Chapter 5, I focused on interest in complex novelty. I argued that people will only be motivated to explore the unknown when they think they can manage. People become more interested in complex novelty when they have a sense that they can cope with the unfamiliarity and difficulty component of complex novelty. Following this, I showed that people who had relatively high coping potential were more interested in complex novelty than people who experienced relatively low coping potential. So, products like computerized cleaning flies or Nano-technology for health monitoring were especially interesting to people who felt they understood what it is or what it is

for (actual coping potential). In addition to this effect of product-specific understanding, interest in complex novelty also increased when people were in a state where they felt able to deal with the unfamiliarity and difficulty component of complex novelty (perceived coping potential).

Taken together, Part 2 of this dissertation showed that anticipation is a key factor for the subjective experience of curiosity. The closer people are to the resolution, the more they anticipate discovering new information, the more the negative feeling of deprivation is reduced. Moreover, the more people anticipate that they can deal with complex novel things, the more curious they will become.

What Happens Next?

A question that was only peripherally part of the current dissertation is what happens after surprise and curiosity are resolved. In this last section, I would like to point out some consequences of surprise and curiosity for subsequent feelings and evaluations, including what may happen when sense-making fails.

When things make sense again

When sense-making is successful, surprise and curiosity dissipate, but there may be downstream consequences for subsequent feelings and evaluations. As outlined in Part 1 of this dissertation, surprise is known to amplify the state that follows it. Based on contrast effects or transfer of arousal (Biernat, 2005; Schachter & Singer, 1962) people are, for instance, happier with unexpected than expected positive outcomes, such as when they unexpectedly gain money or receive a surprise gift

(Mellers et al., 1997; Valenzuela et al., 2009). A practical implication of this amplification potential is that people might be delighted with better-than-expected service (Oliver, 1997) and via affect-as-information (Schwarz, 1990), people might evaluate products more positive when they are introduced using surprises (e.g., in advertising, Derbaix & Vanhamme, 2003). Based on the research in the current dissertation, however, such a strategy will only be effective when people have time to make sense of it. If not, the negativity of not understanding might be used as base for judgment.

While consequences of surprise seem pretty clear, for curiosity it is more difficult to predict what will happen after the resolution. Loewenstein (1994) predicts that resolving curiosity will generally be disappointing, as the outcome cannot match the anticipation and intensity of curiosity that precedes the resolution. Yet, there may be situations that result in more positive states. First, an outcome can simply match or exceed expectancies (e.g., reading a funny end of a story or learning something really interesting), which could make it enjoyable. In addition, the positive feeling associated with resolving an information-gap might transfer to the evaluation of the target and when people predict outcomes, they might be right, which could contribute to enjoying the outcome (e.g., correctly predicting the killer in a murder mystery). Finally, when there is no clear expectation about what there is to discover (as with diversive curiosity, information search for the sake of stimulation rather than a specific answer, Berlyne, 1960), it is unlikely that outcomes are generally disappointing as people may simply enjoy what they come across. Clearly, there is more research needed to

understand what determines the consequences of curiosity. This could also benefit the effectiveness of everyday use of curiosity, such as teaser advertising, cliffhangers, or movie trailers (e.g., Menon, & Soman, 2002), where it is probably not the intention that the anticipation is more exciting than the actual content.

When sense-making fails

Up until now, I have generally focused on situations where, at some point, reality makes sense again. Yet, unexpected outcomes are not always understood and information-gaps not always resolved. What happens when sense-making fails?

The failure to make sense of a surprising or unknown event will most likely result in confusion. Confusion refers to feeling unsure how to proceed in the face of an ongoing mismatch as a result of inconsistency or incoherence (D'Mello & Graesser, 2014; D'Mello, Lehman, Pekrun, & Graesser, 2014). It motivates effortful cognitive activities to resolve it (e.g., careful deliberation; D'Mello et al., 2014). Yet, when confusion persists (D'Mello et al., 2014) and people experience low or no coping potential (Silvia, 2010) it can also result in avoidance, disengagement, or moving to something different. So, an unexpected or unknown outcome results in sense-making. If this does not happen, however, people might get frustrated and, if possible, give up and disengage from the situation (D'Mello & Graesser, 2012; D'Mello et al., 2014).

It should be noted that confusion is less likely to occur with relatively simple knowledge gaps like not knowing some states in America or the contents of a box (Loewenstein, 1994; Van Dijk &

Zeelenberg, 2007). Unsuccessful sense-making in these situations may result in frustration as the not knowing state is continuously unresolved, but not in confusion as there is not really anything to be confused about (i.e., it is very clear what is missing and therefore, there is no mismatch or incoherence; see also the specific vs. diffuse information-gap in the Prologue). When people realize that the missing information will not be found, the anticipation of the resolution of curiosity will also disappear. Without this anticipation, people will most likely give up and curiosity will dissipate. As such, dealing with an unexpected or unknown outcome (e.g., Chapter 1 or 5) does not necessarily imply that people make sense of it, as they can also accept the presence of the unknown and move on.

Conclusion

The chapters in this dissertation show that people first need to master a situation of not knowing before they can appreciate it. This can occur through increased understanding, by feeling close to a resolution, or by feeling able to deal with the unknown. Surprise and curiosity are thus dynamic states that can only be fully understood by disentangling the not knowing from the (almost) knowing component. The findings in this dissertation speak to the importance of knowing and understanding the environment. Knowledge states signal a discrepancy and as long as people do not (almost) resolve this, it feels unpleasant. Only after some sense-making, it can feel good. In other words, it can be nice to be positively surprised, interesting to think

about complex novelty, and enjoyable to explore the unknown—but only when it starts to make sense.