SHORT AND SWEET

The emotional effects of violations of causality, or How to make a square amusing

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Abstract. In Michotte’s launching paradigm a square moves up to and makes contact with another square, which then moves off more slowly. In the triggering effect, the second square moves much faster than the first, eliciting an amusing impression. We generated 13 experimental displays in which there was always incongruity between cause and effect. We hypothesized that the comic impression would be stronger when objects are perceived as living agents and weaker when objects are perceived as mechanically non-animated. General findings support our hypothesis.

Keywords: comic perception, animacy, causality.

Since Aristotle, a crucial determinant of the comic has seemed to be incongruity, involving the juxtaposition of two incongruous frames of reference—that is, the simultaneous presence of two contradictory meanings (Koestler 1964). While most theories and experiments have analysed high-level properties of humorous stimuli or the way they are processed (for a review see Martin 2007), very few studies have been carried out about the role of perceptual factors in comic events (for lifted discrepant weight paradigm see Nerhardt 1970). We aimed at exploring the comic effects of incongruity on visual perception starting from an observation made by Michotte (1946) in his seminal work on causal perception in the launching paradigm. He found that if the launched object was much faster than the launcher, it seemed ‘triggered’ by the first and looked comical. He explained this effect in terms of a disproportion between the first and the second part of the event—ie, the cause and the effect. Lately, some authors have shown that if the second moving object begins to move before contact, it appears to be ‘escaping’ from the first, effect named ‘intentional reaction’ (Kanizsa and Vicario 1968) and ‘psychological causality’ (Schlottmann et al 2002). Moreover, according to Bergson’s theory (1900), the comic impression is proportionally related to the perception of an animate or psychological behavior embodied in a mechanical structure: the stronger the coincidence between living impressions and mechanical features, the stronger the comic result. For instance, an inanimate object always elicits humor when it evokes human behavior (eg, a puppet and vice versa).

We supposed that a disproportion between cause and effect in the launching paradigm is a favorable condition to perceive an event as comical. However, we also hypothesized that incongruous events become funnier when they elicit also a paradoxical impression of animacy: ie, the impression that moving squares behave as animate agents.

The experiment was designed starting from the launching paradigm (Michotte 1946), where one square moves towards a second square, which appears to be ‘pushed’ away by the first. The second part of each animation was manipulated along different parameters. Immediately after contact, the second square could: move towards the bottom of the screen

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(a); change size, becoming lower (b); or thicker and then larger like an elastic (c); or taller (d); flash a different colour (e); smash (f); change shape shrinking in different ways (g, h, i); drum on the spot, tilting forwards (j) or backwards (k) or move away by jumping (l) split in two parts (m) (see Figure 1 for schematic descriptions of Stimuli a-b-d-e-f-g-j-k-l-m).

Figure 1. The three frames in each row represent the first, central, and final parts of animations a-b-d-e-f-g-j-k-l-m. The zig-zag vector represents the path of motion.

Each animation was presented in randomized order to 28 naïve subjects (with five-number age summary: minimum 19, 1st quartile 21, median 23, 3rd quartile 25, maximum 26). Participants’ tasks were first to spontaneously describe (writing on a sheet of paper) what they perceived, and then judge on a 1–10 scale both the perceived animacy and the comic impression. Participants were presented each animation only once to avoid repetition effects.

Spontaneous reports showed that all the animations were ambiguous, as participants saw them either as mechanical or as psychological events: a square that becomes taller, or lower, for instance, can show a dominant versus submissive social attitude, ie a psychological behaviour (Marigonda 1968), or a strictly geometrical variation.

Since participants typically do not always use the full range of response categories, we first normalized each participant’s ratings to the [0, 1] interval. We then did a scatterplot of the two variables to examine the relationship between “comic” rating and “animacy” rating. Figure 2 and Figure 3 show the relationship between “animacy” rating and “comic” rating analyzed by subject and by stimulus (Sarkar 2008). Overall, the plots suggest the presence of a monotonic relationship between “animacy” and “comic” rating.

The relationship between these two variables can be investigated by fitting a linear mixed-effects model with two crossed random effects introduced to account for subjects and stimulus heterogeneity (Bates et al 2011). The fixed-effects component of the fitted model is:

$$c = -0.06 + 0.4a$$

(1)

where the dependent variable is $c$, the “comic” rating, normalized on the 0–1 interval, and the independent variable is $a$, the “animacy” rating, normalized on the 0–1 interval.

The fitted model confirms our hypothesis of a positive relationship. Indeed, the estimated regressor coefficient is 0.4 with a standard error of 0.04, thus resulting in a 95% confidence interval of [0.31, 0.47]. The standard deviation of the two random effects was estimated as 0.09 (subject effect) and 0.16 (stimulus effect).
Results show that when observers described an event in psychological terms, they rated both animacy and comic higher, while if the same event was perceived as mechanical, they rated both animacy and comic lower.

**Figure 2.** The figure displays the scatterplots where the “animacy” and “comic” rating by subject are on the $x$ and $y$ axis, respectively.

**Figure 3.** The figure displays the scatterplots where the “animacy” and “comic” rating by stimulus are on the $x$ and $y$ axis, respectively.
Our hypothesis is supported: incongruity between cause and effect provokes a stronger comic impression if the two geometrical objects are perceived as animate agents, whereas if a mechanical incongruity is perceived between cause and effect, the event can generate a surprise reaction, but the comic impression is weaker.

In conclusion, our findings show that in simple causal displays the paradoxical presence of animacy is an important factor in understanding the perceptual bases of amusement.

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