Erratum: Cutaneous rabbit “hops toward a light: unimodal and cross-modal causality on the skin”

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Edited by:
Marc J. Buehner, Cardiff University, UK

Keywords: cutaneous rabbit effect, multi-modal integration, vision, tactile, localization

A commentary on

“Cutaneous rabbit” hops toward a light: unimodal and cross-modal causality on the skin
by Asai T and Kanayama N (2012). Front. Psychology 3:427. doi: 10.3389/fpsyg.2012.00427

We would like to apply corrections regarding word-by-word citations.

Abstract

The following sentences
Repeated rapid stimulation at the wrist, then near the elbow, can create the illusion of touch at intervening locations along the arm (as if a rabbit is hopping along the arm).

-> should be replaced by
Under some conditions, successive tactile stimuli at some locations on the forearm can be felt as an illusion of movement along the arm (as if a rabbit is hopping along the arm).

P1, left column

L6
A percept that misrepresents physical reality (i.e., an illusion) is both a consequence of and a clue as to the brain’s expectations regarding the external world (Goldreich, 2007).

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We can know through some perceptual illusions how the brain expects an event that is happening in the external world (Goldreich, 2007).

L9
The brain takes advantage of prior knowledge to enhance its perceptual resolution. In the case of tactile perception, spatial imprecision due to low receptor density poses a particular challenge (Goldreich, 2007).

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P1, right column

L3
The CRE is a subset of a larger class of tactile saltation illusions elicited when a mechanical stimulus is followed by similar stimuli rapidly applied at nearby locations (Geldard and Sherrick, 1972; Warren et al., 2010).

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The CRE is a “subset of a larger class of tactile saltation illusions” that could be caused when a stimulus is followed by similar stimuli rapidly applied at adjacent locations (Geldard and Sherrick, 1972; Warren et al., 2010).

L6
For example, repeated, rapid stimulation at the wrist and then near the elbow can create the illusion of touch at intervening locations along the arm, as if a rabbit is hopping along the arm.

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For example, repeated rapid stimulation at a location near the wrist and then at another location near the elbow could be felt as an illusion of movement along the arm, including illusory touch at the intervening location, as if a rabbit is hopping along the arm.

L9
The apparent location of each stimulus moves from the actual stimulation site toward the other stimulation sites in a predictable manner depending on factors such as stimulus location and frequency (e.g., Geldard and Sherrick, 1972; Kilgard and Merzenich, 1995; Cholewiak, 1999; Flach and Haggard, 2006).

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The apparent location of each stimulus moves from the actually stimulated location toward the other location “in a
predictable manner” (e.g., Geldard and Sherrick, 1972; Kilgard and Merzenich, 1995; Cholewiak, 1999; Flach and Haggard, 2006).

L14 The CRE is apparently related to the classic tau effect (Goldreich, 2007), in which the more rapidly traversed of two equal distances defined by three stimuli is perceived as being shorter (Helson, 1930).

L15 The tau effect apparently shares its underlying mechanism with the CRE (Goldreich, 2007): when two equal distances by three stimuli are traversed rapidly, the distance could be perceived as being shorter (Helson, 1930).

L17 When stimulus timing is held constant, the perceived distance between two stimuli both underestimates and grows in proportion with the actual inter-stimulus distance (Marks et al., 1982; Cholewiak, 1999).

L22 These effects have been explained on the basis of the hypothetical idea that the sensory system imputes uniform motion to discontinuous dynamic displays; therefore, there is an assumption of constant velocity motion (Jones and Huang, 1982).

L26 These effects can be interpreted to mean that the sensory system would understand discontinuous dynamic displays as uniform motion; that is, an assumption of constant velocity motion (Jones and Huang, 1982).

P2, left column

L2 Also, a recent Bayesian perceptual model replicated the CRE by assuming that the brain expects tactile stimuli to move slowly (Goldreich, 2007) since we have evolved to detect the movement of external agents (Leslie, 1995).

L10 Certain simple visual displays consisting of moving, 2-D, geometric shapes can give rise to percepts with high level properties, such as causality and animacy. This suggests that just as the visual system works to recover the physical structure of the world by inferring properties such as 3-D shapes, it also works to recover the causal and social structures of the world by inferring properties such as causality and animacy (Scholl and Tremoulet, 2000).

L20 Even simple 2-D moving objects can give us some impressions with high-level properties including causality and animacy, suggesting that just as the visual system works to recover the physical structure of the world by inferring properties such as 3-D shapes, it also works to recover the causal and social structures of the world by inferring properties such as causality and animacy” (Scholl and Tremoulet, 2000).

L26 The ability to combine information from multiple sensory modalities into a single, unified percept is a key element of organisms’ abilities to interact with the external world (Stevenson et al., 2011).

P3, left column

L6 This could indicate that our brain is tuned to detect the movement of an external agent on the skin since an essential, evolutionarily stable feature of brain function is the detection of animate entities for survival (Schultz et al., 2005; Pratt et al., 2010).
This could indicate that our brain is tuned to detect the movement of an external agent on the skin, since for survival, “an essential evolutionarily stable feature of brain function is the detection of animate entities” (Schultz et al., 2005; Pratt et al., 2010).

Furthermore, we argue that sensory events at a certain time point are influenced by future sensory events; this is referred to as “postdictive” sensation (Eagleman and Sejnowski, 2000).

They were recruited randomly from an introductory psychology class, and written informed consent was obtained from all participants before the experiments were conducted. All participants reported normal or corrected-to-normal vision, hearing, and somatosensation and no neurological abnormalities.

They were recruited randomly from an introductory psychology class, and written informed consent was obtained from all participants before the experiments were conducted. None of participants had abnormalities in vision, hearing, and somatosensation.

The most discriminating tactile sensors among primates - the fingertips - house a few hundred sensory nerve fibers per square cm (Johansson and Vallbo, 1979; Darian-Smith and Kenins, 1980).

The fingertips, where in primates the most discriminating tactile sensors are located, have a few hundred sensory nerve fibers per square centimeter (Johansson and Vallbo, 1979; Darian-Smith and Kenins, 1980).

A typical tau effect, where the perceived distance between stimuli dilates as the distance between stimuli is increased (Suto, 1952), reflect just two fundamental perceptual distortions: underestimation of inter-stimulus distance (perceptual length contraction) and overestimation of inter-stimulus time interval (perceptual time dilation; Goldreich, 2007).

A typical tau effect, where the perceived distance between two stimuli gets longer or shorter depending on the actual inter-stimulus distance when stimulus timing is held constant (Marks et al., 1982; Cholewiak, 1999), and the kappa effect, in which the perceived time between stimuli dilates as the distance between stimuli increases (Suto, 1952), reflect “just two fundamental perceptual distortions”: underestimation of inter-stimulus distance (perceptual length contraction) and overestimation of inter-stimulus time interval (perceptual time dilation; Goldreich, 2007).

Given that three successive tactile stimuli define two spatial (S1 and S2) and two temporal intervals (T1 and T2), the somatosensory system intuitively imputes motion at a given speed to the tactiles and tries to equalize the ratios S1/S2 and T1/T2; thus, it follows that S1/T1 = S2/T2 (modified from Jones and Huang, 1982).

Two spatial distances (S1 and S2) and two temporal intervals (T1 and T2) are defined by three successive tactile stimuli. The somatosensory system intuitively interprets these stimuli as motion at a certain speed, equalizing the ratios S1/S2 and T1/T2; thus, S1/T1 = S2/T2 (modified from Jones and Huang, 1982).

In this way, the sensory system - which includes somatosensation, vision, and audition (Cohen et al., 1953; Shore et al., 1998) - tries to equalize the velocity between the ratios S1/T1 and S2/T2; which is the constant velocity assumption (Goldreich, 2007).

Thus, the general tendency is to displace the judged position of a moving target as being relatively far forward along the path of motion (Tremoulet and Feldman, 2006; Getzmann and Lewald, 2007, 2009).

Thus, the general tendency is that the judged position of a moving object is displaced forward along the direction of motion (Tremoulet and Feldman, 2006; Getzmann and Lewald, 2007, 2009).

When participants discriminate the locations of vibrotactile stimuli by ignoring distractor lights, such tactile discriminations are slowed when the distractor light is incongruent with the tactile target (Pavani et al., 2000).

When participants discriminate the locations of vibrotactile stimuli by ignoring distractor lights, the reaction time in tactile discriminations is delayed when the distractor light is spatially incongruent with the tactile stimuli (Pavani et al., 2000).

The rubber hand illusion (RHI) refers to the effect of watching a rubber hand being stroked synchronously with one’s own, unseen hand. Viewing this for a short time causes the observer to perceptually assimilate the rubber hand into his or her own body (Botvinick and Cohen, 1998).

The rubber hand illusion (RHI) is a tactile illusion where watching a rubber hand being stroked synchronously with one’s own hand for a short time causes the subjective feeling of illusory body-ownership of the rubber hand or causes the sense of attribution of the rubber hand to participants’ own body (Botvinick and Cohen, 1998).

Cross-modal causality plays a key role in governing the integration of sensory information, depending on its ecological plausibility (Schutz and Kubovy, 2009).
Causality perception among modalities is fundamental for integrating sensory information, depending on the ecological plausibility (Schutz and Kubovy, 2009).

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Humans can use the similarities between the temporal structures of sensory signals in different modalities to solve the correspondence problem, ultimately inferring causation from correlation (Parise et al., 2012).

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Humans can use the similarities between the temporal structures of sensory signals in different modalities to handle the correspondence problem, “ultimately inferring causation from correlation” (Parise et al., 2012).

L30
Illusory sequences activate the contralateral primary somatosensory cortex at somatotopic locations corresponding to the filled-in illusory perceptions on the forearm (Blankenburg et al., 2006); this suggests that this illusion is associated with the early sensory body map represented in S1.

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Illusory sequences activate the contralateral primary somatosensory cortex (Blankenburg et al., 2006), suggesting an association with the early sensory body map in S1.

L38
Small amounts of latency between vision and touch (or sound) tend to be reduced and go unnoticed, because the timing of visual events is flexible and adjusts immediately (for a review, see Vroomen and Keetels, 2010).

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Small amounts of latency between vision and touch (or sound) tend to be reduced because the timing perception in vision is flexible and adjusts immediately (for a review, see Vroomen and Keetels, 2010).

L53
The CRE and its interaction with vision indicate that future sensory events, even if the modalities are crossed, affect past sensory experiences. This is called “postdictive” sensation (Eagleman and Sejnowski, 2000).

The CRE and its interaction with vision indicate that sensory events at a given time point are influenced by future sensory events; this is called “postdictive” sensation (Eagleman and Sejnowski, 2000).