Perception, 2011, volume 40, pages 1009 – 1011

doi:10.1068/p6880

SHORT AND SWEET

Simultaneous perception of both interpretations of ambiguous figures

Melinda S Jensen, Kyle E Mathewson

Department of Psychology, and Beckman Institute, University of Illinois at Urbana-Champaign, Urbana, IL 61801, USA; e-mail: jensenm@illinois.edu

Received 30 November 2010, in revised form 11 July 2011; published online 1 September 2011

Abstract. When viewing ambiguous figures like the classic duck/rabbit, people alternately perceive one interpretation and then the other, but not both interpretations at once. When two identical ambiguous figures appear together, the majority of observers perceive them as identical, and they typically alternate in unison. Just as most observers cannot see a single figure as both a duck and a rabbit, most cannot see one figure in a pair as a duck and the other as a rabbit even though the two figures and their features are spatially distinct. Is this inability to see both interpretations an inherent limitation of the visual system or is it just due to differences in top – down processing? We show that a simple prompt immediately allows people to see both interpretations, to their own surprise.

For ambiguous figures, the 'ambiguity' refers to the multiple interpretations the figure affords, not to the ambiguity of the percept. Once you know both interpretations of an ambiguous figure, your percept seems to alternate between them: a duck or a rabbit (Jastrow 1899), a kangaroo or a whale (Kihlstrom 2006), an old woman or a young woman (Hill 1915).

Research on ambiguous figures has primarily focused on why and when people make one interpretation over another (see Toppino and Long 2005 for a review). Satiation theories propose that figure reversals result from neural fatigue (bottom – up processing). More top – down accounts credit figure reversal to executive processes like attentional and inhibitory control (see Toppino and Long 2005 for a review). The real answer may lie somewhere inbetween (Mitroff et al 2006).

In this paper, we instead address the question whether we have to make one interpretation over another. Is it possible, for instance, to perceive different interpretations of two identical side-by-side ambiguous figures?

Although prior studies have used multiple identical ambiguous figures, few have explored if and when we interpret the figures differently. The sum of this work suggests that when viewing a group of identical ambiguous figures, we generally perceive all of the group members the same way, with the interpretations shifting in unison (Adams and Haire 1958; Attneave 1968; Babich and Standing 1981; Grossman and Dobbins 2003). However, interpretations may reverse independently under certain conditions (see Long and Toppino 2004 for a review).

Would people report seeing the same interpretation of both figures and be unable to see opposing interpretations of the figures? This hypothesis was first tested during a lab discussion with a hastily drawn pair of duck/rabbit figures on a blackboard. While most of the lab saw matched interpretations, the first author saw opposing interpretations. When she proclaimed "It's like the duck is about to eat the bunny", the rest of the group reported the sudden phenomenological experience of seeing both interpretations, a sort of 'Aha' experience we have witnessed when demonstrating this effect since (including VSS demo night, 2010). In the following study, we replicate this result in controlled conditions with a naive subject population.

Sixty-four subjects answered questions on a printed packet in exchange for a candy bar after giving informed consent. Participants answered 6 questions for each of 3 ambiguous figures: duck/bunny rabbit (DB), whale/kangaroo (WK), and the old/young (OY) woman.

For each figure, subjects saw a single ambiguous figure listed with both interpretations and reported their own interpretation. Then, subjects were asked to look at pairs of figures (see figure 1) and to 'try hard' to make the same and then different interpretations of the figures. Subjects next received a relational phase: imagine the duck is about to eat the rabbit, the kangaroo is about to bounce on the whale, or the young lady is watching the old lady, and finally reported again whether they could "see them as different figures at the same time?".

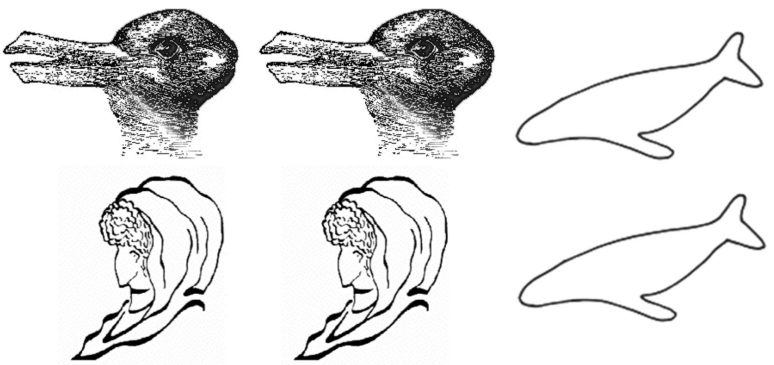

Figure 1. Pairs of ambiguous figures.

The number of subjects who had seen the figures before varied by figure (DB: 41%, WK: 2%, OY: 60%). However, responses for familiar and unfamiliar figures did not differ. Most subjects reported seeing matched interpretations of pairs of the figures (DB: 97%, WK: 88%, OY: 80%). A few subjects spontaneously saw the two figures as different, and many could do so with effort (seers). When asked to try really hard, approximately half of subjects reported seeing both interpretations simultaneously (DB: 62%, WK: 66%, OY: 41%). However, the remainder of subjects could not simultaneously hold both interpretations even with effort (non-seers).

For all three figures, providing the cue allowed the majority of these non-seers to perceive opposing figures when they could not before [for DB: 66% (38/57), $\chi^2_{1,61} = 25.2$, $p < 0.01$; WK: 81% (40/49), $\chi^2_{1,61} = 5.88$, $p < 0.02$; OY: 74% (25/34), $\chi^2_{1,61} = 5.49$, $p < 0.02$]. Providing the cue often created an 'Aha!' experience for subjects. Many of them wrote exclamations in their responses: "Yes!", "yes!!!", "oh Yes! Finally!", "Yes—more easily", "Yes. That tip makes it easier to picture them at the same time".

This result has two important theoretical implications. First, the effectiveness of the relational cue illustrates the strength of top–down influences over our conscious perceptions. Second, our ability to see opposing interpretations highlights the flexibility of our perceptual systems. We are not limited either by bottom–up processing or by our top–down settings to make only one interpretation of the same kind of stimulus at the same time. At least some viewers are able to see both interpretations. Understanding the variability in possible interpretations between viewers and the extent of perceptual flexibility across viewers will help us to better understand and characterize our visual experience of the world.

Over and above the theoretical implications or the potential of future research, after over 100 years of living in constant opposition to one another, a single phrase has finally allowed the duck and rabbit to coexist side-by-side.

Acknowledgments. We would like to thank Daniel J Simons for comments on a previous draft of this manuscript, as well as Alejandro Lleras, the Vision lab group, and the Viscog lab group for helpful discussion.

References

Adams P A, Haire M, 1958 "Structural and conceptual factors in the perception of double-cube figures" *American Journal of Psychology* **71** 548 – 556

Attneave F, 1968 "Triangles as ambiguous figures" *American Journal of Psychology* **81** 447 – 453

Babich S, Standing L, 1981 "Satiation effects with reversible figures" *Perceptual and Motor Skills* **52** 203 – 210

Grossman J K, Dobbins A C, 2003 "Differential ambiguity reduces grouping of metastable objects" *Vision Research* **43** 359 – 369

Hill W, 1915 "My wife and my mother-in-law" *Puck* November 6

Jastrow J, 1899 "The mind's eye" *Popular Science Monthly* **54** 299 – 312

Kihlstrom J F, 2006 "A new reversible figure and an old one" paper presented at the annual meeting of the Society of Experimental Psychologists, La Jolla, CA, March 25, 2006

Long G M, Toppino T C, 2004 "Enduring interest in perceptual ambiguity: alternating views of reversible figures" *Psychological Bulletin* **130** 748 – 768

Mitroff S R, Sobel D M, Gopnik A, 2006 "Reversing how to think about ambiguous figure reversals: Spontaneous alternating by uninformed observers" *Perception* **35** 709 – 715

Toppino T C, Long G M, 2005 "Top – down and bottom – up processes in the perception of reversible figures: Toward a hybrid model", in *Dynamic Cognitive Processes* Eds N Ohta, C M Macleod, D Uttl (Tokyo: Springer) pp 37 – 58

ISSN 0301-0066 (print) ISSN 1468-4233 (electronic)

PERCEPTION
VOLUME 40 2011

www.perceptionweb.com