Counterpoint: Distinguishing between perception and judgment of spatial layout

Frank H. Durgin

Swarthmore College

Word count main text: 1085 (full document 2117)

Author Note

Frank H. Durgin, Department of Psychology, Swarthmore College.

The author was supported by Award Number R15 EY021026 from the National Eye Institute. The content is solely the responsibility of the author and does not necessarily represent the official views of the National Eye Institute or the National Institutes of Health.

Correspondence concerning this article should be addressed to Frank H. Durgin, Department of Psychology, Swarthmore College, 500 College Ave, Swarthmore, PA 19081. E-mail: fdurgin1@swarthmore.edu

Abstract

Claims about alterations in perception based on manipulations of energetics (and other influences) are often framed as interesting specifically because they affect our perceptual experience. Many control experiments conducted on such effects suggest, however, that they are the result of attribution effects and other kinds of judgmental biases influencing the reporting process rather than perception itself. Schnall (in press), appealing to Heider's work on attribution, argues that it is fruitless to try to distinguish between perception and attribution. This renders the energetics hypothesis of less interest.

Keywords: embodied perception; space perception; glucose; demand characteristics

Counterpoint: Distinguishing between perception and judgment of spatial layout

Schnall (in press) argues that theories of attribution can help explain why some labs report data that seems inconsistent with the energetics hypothesis of space perception. I will argue that Schall's position not only neglects the important role of control experiments that seek to test alternative hypotheses, but that it also trivializes the energetics hypothesis by conflating explicit judgment with perceptual experience. Energetic considerations must affect choices, but they probably contribute directly rather than by affecting the perception of spatial layout.

Why do hills look so steep (Durgin & Li, in press, Kammann, 1967; Ross, 1974)? A hill of 5° is normally perceived to be about 20°, even measured implicitly (Li & Durgin, 2010, 2013). Proffitt, Bhalla, Gosweiler and Midgett (1995) proposed that the perceptual exaggeration of hills is the result of energetic considerations being embedded in perception so as to affect decisions about navigation. In contrast, Li and Durgin (2010) have proposed that perceptual slant exaggerations, which are experienced underfoot even by the congenitally blind (Hajnal, Abdul-Malak & Durgin, 2011), represent perceptual scale expansion that contributes enhanced sensitivity to the immediate control of action (Durgin & Li, 2011; Durgin, 2104).

These two theories differ in how malleable they expect perception to be. The scale expansion hypothesis depends on a predictable (exaggerated) coding of slant so that action can be calibrated. The energetics hypothesis argues that changes in physiological state can immediately alter perceived slant, as illustrated by Bhalla and Proffitt's (1999) famous study using heavy backpacks. So do backpacks affect how steep things look?

Durgin et al. (2009) reported a novel control condition in a backpack study. The control showed that carrying a heavy backpack full of scientific equipment was insufficient to produce changes in estimated slant, whereas participant beliefs that the experimenter expected the heavy weight to affect estimates seemed to matter[1] – a finding replicated later using multiple variations to control for various alternative hypotheses (e.g., Durgin, Klein, Speigel, Strawser & Williams, 2012a; Durgin, Ruff & Russell, 2012b; Shaffer, MacManama, Swank & Durgin, 2013). These results are problematic for the energetics account of perceptual experience (Firestone, 2013).

Moreover, Shaffer et al. (2013) showed that when participants were insightful about the energetics hypothesis, but misconstrued the experimental manipulation, their judgments went opposite to those predicted by energetics. Specifically, participants who arrived in the lab after fasting and were administered a sweetened drink that did not contain sugar both (1) typically assumed that the drink had contained sugar (a misconstrual) and (2) often (25%) believed that the sugar was supposed to affect their estimates of slant[2] (were insightful despite an elaborate cover story). This insightful group of miscontruers gave lower estimates than everyone else, rather than higher ones.

Schnall suggests we can't tell why people made these lowered judgment, but the insightful participants affected in this experiment were precisely the ones mistaken about the condition they were in (due to their miscontrual). If they had resisted cooperation (as Schnall proposes), they would have given *higher* estimates of the hill; but they didn't. Their lower estimates, which cannot be predicted by energetics (they hadn't been given sugar), nor by anti-cooperation (they thought

they had been given sugar), are thus either a sign of cooperation with their insightful beliefs about the energetics theory (given the misconstrual of what condition they were in) or something else. Crucially, these estimation biases only occurred for those with low blood sugar (not for insightful participants who had actually received sugar), consistent with the previously hypothesized role of (low) sugar in increasing likelihood of cooperation with experimental demand (e.g., Durgin, Hajnal, Li, Tonge & Stigliani, 2010, 2011).

Schnall (in press) mentions our subsequent work (Williams, Ciborowski & Durgin, 2012) on attribution effects: Participants (all in state of low blood sugar) behaved differently after drinking diet ginger ale[3] poured from a non-diet bottle rather than from a diet bottle. The misconstrual condition led to judgmental bias: They gave higher estimates of the slant of stairs and gave higher estimates of the number of Stroop trials they had done between having the drink and making the estimate. Many studies of low blood sugar and cognition may inadvertently confound low blood sugar (the intended manipulation) with misconstrual by participants (who tend to assume that drinks they are given contain sugar). Construals matter, and they can sometimes be controlled implicitly.

But Schnall argues that attribution (when consistent with the energetics hypothesis) actually affects perception, pointing out that there are established theories that can predict why control experiments might conceal perceptual attributional differences that are revealed by prior experiments. This argument seems problematic for at least two reasons.

First, Schnall seems to have some predictions backwards. Schnall discusses primarily the Durgin et al. (2012a) instructional manipulation, but Schnall's conclusion requires that the use of a deceptive cover story in our many other studies also disrupts the normal attributional processes by making the backpack salient. (By Schnall's hypothesis, this would allow people not to be affected by the backpack.) The weakness of Schnall's framing, however, is that the original experimental procedure of Bhalla and Proffitt (1999) – asking people to wear a heavy backpack to estimate its weight, and then leaving it on – is already abnormal compared to the typical human purpose for wearing backpacks (to carry things). So how do you get people to wear a heavy backpack without calling attention to it? If people normally wear backpacks in order to carry things, then being asked to wear a backpack to carry equipment – as the various deceptions we have used typically do (e.g., Durgin et al., 2009; Durgin et al., 2012b; Shaffer et al., 2013) seems much more plausibly generalizable to the normal use of backpacks. Our three deception manipulations lend force to the conclusion of Durgin et al. (2012a) that backpacks, when explicitly worn for the purpose of carrying things, typically have no effect on *estimates* of slant, let alone perception.

The second fundamental problem with Schnall's argument is that suggesting that perceptual experience is the same as attribution trivializes the energetics hypothesis. Should we be interested in this work if it is just about judgment? Isn't it the purported effect on perception that made the theory interesting? Conflating (judgmental) attribution effects with perception has been a common artifact of the energetics approach, and this is why many psychologists have rightly lost interest in

it. To the extent that energetics theorists have stopped asking Koffka's (1935) question, "Why do things look as they do?", their theories aren't really about perceptual experience at all.

Footnotes

1. Note that Durgin et al. (2009) did not take participant reports at face value. On the contrary, they observed that people who reported that they thought their perception had been affected by the backpack manipulation had indeed been the ones to give high estimates. Durgin et al. interpreted this affirmation as an implicit admission of cooperation rather than as an explicit insight into a real perceptual effect. How could those participants have known their perception had been affected if they only saw the slope when wearing the backpack?

2. Shaffer et al. (2013) eliminated the Stroop task that typically intervenes between the drink manipulation and the hill estimation task because we had observed that many participants in Durgin et al. (2012a) assumed the sugary drink was supposed to influence (only) the Stroop task, and that the backpack (only) was supposed to affect the hill task. Shaffer et al. simply had participants wait ten minutes for the "electrolytes" in the liquid to be absorbed. As expected, removing the Stroop task allowed some people to think the drink was relevant to the hill estimation task despite our deception. The rate of reported suspicion was similar to that in the deception condition of our original backpack study (25%: Durgin et al., 2009).

3. Ginger ale was selected because its strong flavor very effectively masks the taste of the sweetener used in these sodas, though the haptic consistency is detectably different (less syrupy) in side-by-side comparison.

References

Bhalla, M., & Proffitt, D. R. (1999). Visual-motor recalibration in geographical slant perception. *Journal of Experimental Psychology: Human Perception and Performance, 25,* 1076– 1096.

Dean, A. M., Oh, J., Thomson, C., Norris, C. J., & Durgin, F. H. (2016). Do individual differences and aging effects in the estimation of geographical slant reflect cognitive or perceptual effects? *i-Perception, 7(4)*, 1-18. DOI: 10.1177/2041669516658665

Durgin, F. H., Baird, J. A., Greenburg, M., Russell, R., Shaughnessy, K., & Waymouth, S. (2009). Who is being deceived? The experimental demands of wearing a backpack. *Psychonomic Bulletin & Review, 16*, 964-969.

Durgin, F. H. Hajnal, A., Li, Z., Tonge, N., & Stigliani, A. (2010). Palm boards are not action measures: An alternative to the two-systems theory of geographical slant perception. *Acta Psychologica, 134*, 182-197.

Durgin, F. H. Hajnal, A., Li, Z., Tonge, N., & Stigliani, A. (2011). An imputed dissociation might be an artifact: Further evidence for the generalizability of the observations of Durgin et al. 2010. *Acta Psychologica, 138*, 281-284.

Durgin, F. H., Klein, B., Spiegel, A., Strawser, C. J., & Williams, M. (2012a). The social psychology of perception experiments: Hills, backpacks, glucose and the problem of generalizability. *Journal of Experimental Psychology: Human Perception and Performance, 38*, 1582-1595.

Durgin, F. H., Leonard-Solis, K., Masters, O., Schmelz, B., & Li, Z. (2012). Expert performance by athletes in the verbal estimation of spatial extents does not alter their perceptual metric of space. *i-Perception, 3(5)*, 357-367.

Durgin, F. H., & Li, Z. (2011). Perceptual scale expansion: An efficient angular coding strategy for locomotor space. *Attention, Perception & Psychophysics, 73*, 1856-1870.

Durgin, F. H., & Li, Z. (in press). Why do hills look so steep? In A. Shapiro and D. Todorovic (eds.), *Oxford Compendium of Visual Illusions.* Oxford University Press.

Durgin, F. H., Ruff, A. J., & Russell, R. (2012b). Constant enough: On the kinds of perceptual constancy worth having. In G. Hatfield and S. Allred (eds.), *Visual Experience: Sensation, Cognition and Constancy* (pp. 87-102). Oxford University Press.

Firestone, C. (2013). How "paternalistic" is spatial perception? Why wearing a heavy backpack doesn't—and *couldn't*—make hills look steeper. *Perspectives on Psychological Sciences, 8,* 455-473.

Hajnal, A., Abdul-Malak, D. T., & Durgin, F. H. (2011). The perceptual experience of slope by foot and by finger. *Journal of Experimental Psychology: Human Perception and Performance, 37*, 709-719.

Kammann, R. (1967). The overestimation of vertical distance and slope and its role in the moon illusion. *Perception & Psychophysics*, *2*, 585-589.

Koffka, K. (1935). *Principles of Gestalt Psychology*. New York: Harcourt.

Li, Z. & Durgin, F. H. (2010). Perceived slant of binocularly viewed large-scale surfaces: A common model from explicit and implicit measures. *Journal of Vision, 10(14):13*, 1-16.

Li, Z. & Durgin, F. H. (2013). Depth compression based on mis-scaling of binocular disparity may contribute to angular expansion in perceived optical slant. *Journal of Vision, 13(12):3*, 1–18.

Proffitt, D. R., Bhalla, M., Gossweiler, R., & Midgett, J. (1995). Perceiving geographical slant. *Psychonomic Bulletin and Review, 2,* 409–428.

Ross, H. E. (1974). *Behavior and perception in strange environments.* London: George Allen & Unwin.

Schnall, S. (in press). Social and contextual constraints on embodied perception. *Perspectives in Psychological Science.*

Shaffer, D. M., McManama, E., Swank, C., & Durgin, F. H. (2013). Sugar and space? Not the case: Effects of low blood glucose on slant estimation are mediated by beliefs. *i-Perception, 4*, 147-155.

Williams, M., Ciborowski, N., & Durgin, F. (2012). Estimates of visual slant are affected by beliefs about sugar intake [abstract]. *Journal of Vision, 12,* 905.