

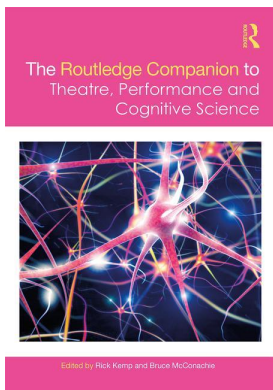
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### **Attention to Theatrical Performances**

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# ATTENTION TO THEATRICAL PERFORMANCES

*James Hamilton*

How do audiences attend to theatrical performances? An account of attention is useful to theatre and performance studies for the obvious reason that attention is the necessary first step for coming to an understanding of how audiences grasp and respond to a performance.

In the first section of this entry, I situate attention to performances within current debates about attention in psychology, neuroscience and philosophy. From that vantage point, we can survey the demands that must be placed on any model of attention by the specifics of performance and the relevant behavioural goals such a model must be responsive to. I address these tasks in the second and third sections of the entry. Note that I use the words ‘audience,’ ‘spectator’ and ‘attendant’ interchangeably. I favour the latter term although I do not argue for its use (di Benedetto 2007).

## **I. ‘Attention’ in empirical and philosophical literature**

Attention is usually thought to occur at the initial stages of perception and to cause the delivery of perceptual content to the senses (Zhang and Lin 2013). And it is thought to be important for managing the limited resources available in sensory areas of the neocortex. Some influential theorists regard the phenomena of perception and attention as reducing uncertainty in predictions that we make about what we are going to encounter (Feldman and Friston 2010; Friston et al. 2012). These phenomena are understood within the theory that the brain has evolved as a mechanism for reducing free energy expenditures within the lives of animals (Yu and Dayan 2005a; Friston 2009).

The ideas of ‘reducing uncertainty in predictions’ and ‘free energy’ are directly connected:

Free energy is a quantity from information theory that quantifies the amount of prediction error or, more formally, it is a variational approximation to the surprise or negative log likelihood of some data given an internal model of those data.

*(Friston 2012, 249)*

Some recent debates have concerned whether attention causes the delivery of perceptual content to the senses or is, rather, an effect of an animal’s decision-making process (Krauzlis et al. 2014). Those debates have arisen out of the investigation of relationships

between attention and action. Other debates concern which uncertainties are reduced – whether it is uncertainties about the locations of objects or about their properties, or somehow about both (Chikkerur et al. 2010).

The state of the relatively young science of perception and attention is illuminated by considering problems with the key distinctions that have guided research in the empirical literature about attention for the past 70 years.

One distinction concerns whether the kind of attention being investigated is guided by what is internal to the animal ('endogenous') or whether it is guided by what is external to an animal ('exogenous'). Endogenous attention is task-driven and exogenous attention is comparatively task-independent. Another distinction concerns whether the form of attention being investigated is tied to eye-movements ('overt') or can shift around independently of where the subject is 'fixated' at any given moment ('covert'). Yet another distinction concerns whether animals are attending to environments only in a 'distributed' fashion, gaining thereby a fuller but less detailed sense of what is around them, or if they are more narrowly 'focused' in attending to a limited number of specific objects or a limited number of the specific features of an object (Mack 2002; Nanay 2016). Each of these frequently overlapping distinctions has been made within a view that the function of attention – no matter whether that function is as cause or as effect – is to 'facilitate target processing while inhibiting distraction and noise' (Chun, Golomb, and Turk-Browne 2011, 77).

All of these distinctions have problems, as is revealed, for example, by an examination of endogenous and exogenous attention when those modes of attention are understood or referred to as 'top-down' versus 'bottom-up' attention control. One problem with that distinction concerns just what the relation between them is. Evidence from studies showing that attention can be captured by low-level salient, task-irrelevant features has convinced some that top-down attention is actually governed by bottom-up processes; however, evidence from studies showing that low-level salient stimuli can effectively be ignored has convinced others that immediately upon bottom-up stimulation, top-down attention is invariably employed according to the goals of the agent (Hickey, van Zoest, and Theeuwes 2010). Theatrical examples of both low-level and top-down attention can readily be found. The first appearance of Hedda, according to the script for the play *Hedda Gabler*, is heralded by sounds she makes in the hallway prior to entering the room. Changes in sounds and movements are salient features that capture attention. But later in the same play, and based on a spectator's understanding of the character of Judge Brack, a perceptive attendant will expect Brack to use what he knows to attempt to exert power over Hedda. And such a spectator will attend closely and with anticipation to Hedda picking up a pistol at that point. Prior understanding is crucial to the top-down management of both expectations and attention (Saltz 2006; Blair 2010).

Another problem is that the top-down versus bottom-up picture seems to have foundered over the fact that some strong selection biases cannot be explained using either side of the distinction. In particular, neither side of the distinction can explain selection biases stemming from the history of selection that seem to govern some current selections nor some biases in current selections that seem to be governed by past rewards (Awh, Belopolsky, and Theeuwes 2012). Finally, the so-called 'top-down control of attention' is deeply involved in the very area that bottom-up attention was supposed to be controlling – namely, in the deployment of attention for spatial selection (Hunt and Kingstone 2003; Zelinsky et al. 2005). If a theatre-goer is already familiar with the play, *Hamlet*, he will expect to look and see something on the parapet and as a result be conducting a visual search at that location, even if the movement or sounds of whatever or whomever represents Hamlet's father's ghost is what triggers the attention.

Reliance on these distinctions is further complicated by the advent of *cross-modal* studies of attention – attention that relies upon visual, auditory, tactile and other sensory inputs (Li et al. 2008; Ide, Zhang, and Li 2014).

Most models of eye-gaze guidance and visual search have been built on the assumption that low-level conspicuousness is to be explained by appeal to features that can be replicated in static pictures, are pre-attentively salient, become salient to an agent in a manner that is task-free and stimulus driven and are aimed at providing an explanation of spatial rather than temporal aspects of viewing behaviour (Tatler et al. 2011, 4–8). This way of understanding eye-gaze guidance and visual search has made it easier to develop computational representations and modeling of attention – a worthy goal of attention studies (Itti and Koch 2001; Borji, Sihite, and Itti 2012; Itti and Borji 2015; yet also see Zhang and Lin 2013, 167–206). But the foregoing disagreements and debates are part of what supports the claim that there may be no single model of attention (Chun, Golumb, and Turk-Browne 2011, 76; Lavie et al. 2004). And, in any case, this is not what is needed in theatre and performance theory, where most attendants already know they are at the theatre, watching and listening to moving and speaking performers, and are actively trying to figure out what it is they are spectating during the time of the performance.

Accompanying the lack of clarity and precision in the uses and applications of the leading distinctions in the empirical literature is also the adoption, by philosophical theorists, of larger but competing metaphysical models of what is going on in our brains when we attend, perceive and cognitively and emotionally grasp the world. Some of those models hold that we directly perceive and are physically involved in a way that shapes our perceptions (Clark 2013, 2015). Others hold we infer the causes of our perceptions, and so we must be distinct from the rest of the world (Hohwy 2012).

Yet, despite the disagreements within the empirical and philosophical communities, there are five important factual claims for which there is converging evidence. First, specification of tasks is important to models of attention-guidance and attention-selection across modalities (Yu and Dayan 2005b; Land and McLeod 2000). For example, the common tendency to look into empty spaces in anticipation of an event is problematic for bottom-up conspicuity models precisely because they rely on task-free skills and low-level feature salience. Whereas, if attention-guidance and attention-selection across modalities are determined by the activities the agent is engaged in – by her tasks – anticipatory searching is readily explained. This is an important key to understanding how a spectator's attention is focused within a theatrical performance as well as how performers create focal points (Chaikin 1980, 59). In *King Lear*, Act III, Scene vi, Lear, deep into madness, is brought by Kent to a farmhouse adjoining Gloucester's castle, accompanied by the King's Fool and by Edgar, Gloucester's estranged son. He begins to arraign his absent daughters, Regan and Goneril. Looking into empty air, he first arraigns Goneril. A typical spectator will search the space in front of Lear for any trace of her and will not settle on a specific place until the Fool says, 'Cry you mercy, I took you for a joint stool'. Moreover, this feature of theatrical performances – that they induce spectators to attend to places before the action in them commences – is also relied upon by animators and cartoonists (Johnstone and Thomas 1995, 51–3; Cohn and Wittenberg 2016).

Second, if the subjects being studied or modeled are aware of the actual task at hand and actively participate in that task, they tend to shape 'their distribution of attention to match the expected events' (Hayhoe et al. 2003, 49–50). If they are not, or are prompted to attempt a different task, previous episodes of attention to a scene or stages of a scene neither are remembered nor guide attention. One phenomenon that brought this to light is often called 'change blindness' (Levin and Simons 1997; Simons and Levin 1997, 1998). The classic

examples of change blindness occur when a subject fails to detect changes in a scene when focused upon a non-relevant task. Simons and Levin report cases in which, when being asked directions, subjects failed to notice that the *persons* asking for the directions had actually changed – were in fact different people – while a large object was briefly carried between them, obscuring the changes in personnel, but where the changes were perceptible. The problem is that the tasks the subjects believed they were supposed to undertake, and to which they were attentive, prevented them from recognising the changes that occurred in the scenes they actually experienced. Theatre provides a contrasting case to these in one respect because for the most part theatre and performance theorists *can* simply assume that attendants with a certain level of experience know they are witnessing a theatrical performance and are trying to figure out the same performance that is observed by others in attendance. That is their relevant task.

Third, regularities in the attended environment – which are common in theatrical performances, especially in the behaviour of performers – are important for attention–guidance (Zhao, Al-Aidroos, and Turk-Browne 2013). Every performer works at selecting what to do and how to say things (if there are to be spoken lines) in a manner that is consistent across scenes. And in traditional acting, only one person, with his or her distinctive persona, will play a given character (Hamilton 2013, 42–44). For something of an outlier example, members of Actors from the London Stage, who perform entire plays by Shakespeare using only four–five performers, provide regularities to their audiences in the form of multiple but simple identifying props (<http://shakespeare.nd.edu/actors-from-the-london-stage/about/> – accessed 17 November, 2017).

Fourth, Bayesian inference – that shows precisely how individuals challenge their ‘prior beliefs’ by confronting them with their current experiences and thereby infer new, ‘posterior beliefs’ – is involved in all current models of attention, perception and cognition, including the recognition and response to affect in other animals (Pollick et al. 2001; Friston 2012). Indeed, it is

a guiding assumption of prediction error minimization theories of attention and perception ... that any system that minimizes long-term prediction error will approximate Bayesian inference.

(*de Bruin and Michael 2017, 59*)

Other terms for ‘beliefs’ might be ‘expectations,’ ‘credences’ or ‘predictions,’ and I will use those words interchangeably.

Several aspects of Bayesian inference are important to models of attention, perception and cognition. Bayesian inferences are often undertaken without awareness (Perfors et al. 2011). The prior beliefs we have are already informed by prior experience, so the notions of a ‘data-stream’ or the ‘collection of data’ do not presuppose anything about the metaphysical nature of that data. Nor should we make such presuppositions, for example, by claiming that the ‘data-stream’ consists of theory-independent materials for theory construction (Glymour 2000; Noë 2007). Moreover, Bayesian inference does not deny but cuts right across the ‘top-down/bottom-up’ distinction that has often been invoked in studies of visual perception. All of this is important to understanding the reception of theatre because its events, each of which must be understood (at some level) when they happen, take time to unfold and also are connected ... over time. So, a spectator’s attention must not only adjust to what is happening at any given moment within that moment, but must also adjust both to what happens in the next moments and what has happened in the previous moments as well.

Fifth, and finally, attention is connected to preparation for action and to action. The idea of ‘passive’ data-collectors and hypothesising observers – if ever it did hold sway among cognitive scientists and philosophers of perception – has certainly collapsed in light of the important connections now drawn between attention, preparedness for action and action (Yu and Dayan 2005b; Creem-Regehr and Kunz 2010; Wu 2011; Friston et al. 2010; Friston 2012; Friston et al. 2013). This is parallel to the fact that theatre practitioners and theorists have rejected the idea that attendants to theatrical performances are ‘passive,’ a trope that (sometimes deliberately) mis-describes spectator behaviour, even in the least interactive styles of theatre that have been preeminent in the Western tradition.

## II. ‘Attention’ in a theory of theatre and performance

These five agreed-on fact claims – that tasks guide attention, that awareness of the relevant task is crucial to attention guidance, that regularities in the attended environment also assist in guiding attention, that Bayesian inference is involved in all models of attention, perception, and cognition, and that attention is connected to preparation for action – suggest that we can understand theatrical performances in a new way, as signalling games. In a simple signalling game, we have two players – a sender and a receiver. The senders send signals to the receivers who cannot observe the situation directly, but can observe the signal. Receivers then choose and perform actions that affect both the senders and the receivers themselves in the attempt to get a positive payoff for both (Skyrms 2010; Kuhn 2014).

Crucial to the application of this model to theatrical performance is the fact that receivers, like attendants in theatre, are active (Ranciere 2009, 13). They do not, despite appearances to the contrary, passively and directly perceive the world of the play; instead, they actively draw inferences about what is to happen and gradually – guided by the performers’ signals – build up a conception of that world and react to it. The discrepancy – between the feeling of direct, passive perception of the theatrical world and the reality of inference-drawing on the basis of sensory cues – is one aspect of the important fact that many of the inferences attendants make are often well below the level of conscious awareness.

A full philosophical theory of theatre modeled as a signalling game must have at least three parts. One part concerns how signals are generated and sent. A second part concerns how attendants pay attention to and have their attention captured by performances.

A third part concerns how attendants draw further inferences, that is, develop and change their expectations or predictions about what is going to happen and what kind of thing is causing what they attend to, in response to changes in what they are attending. For that third part, perhaps a ‘meta-Bayesian’ account of updating is required (Daunizeau et al. 2010). And this looks promising for two reasons.

First, an interesting example of change from a prior to a posterior belief that depends crucially on the data as it is presented is provided by what happens when an attendant observes two different performances of, say, *Richard II*. Suppose one of those performances has its modern intermission set right after Richard has shown himself to be a brash but clear-eyed and greedy cynic (i.e., after Acts I and II). An attendant to such a performance is unlikely to ever take Richard’s ‘epiphany’ in Act V very seriously. If, in contrast, the intermission is set after Act I and all of II except that last scene – where the Queen declares him ‘much put upon’ and a ‘sweet guest’ – an attendant is much more likely to take the later epiphany seriously and perhaps even to come to view Richard as alternating between anger and self-pity (Toole 1978, 166–67). A similar case is to be found when thinking of a spectator to the 1947 performance of *A Streetcar Named Desire* who finds

Blanche ‘neurotic and unlikable,’ but when seeing the *movie* version in 1951, other critics found a ‘nuanced and sympathetic Blanche.’ One important difference appears to be that in the play there was an intermission between scenes four and five that solidified the negative conclusions about Blanche, whereas no such intermission occurred in the movie (McConachie 2014).

Second, the fact that attendants develop and change their credences about what *kind* of object is being performed is also a reason for adopting a hierarchical Bayesian theory about changes in credences when modelling the reasoning of audiences (Goodman et al. 2011; Hamilton 2015). For this model shows how it is possible for a spectator to correctly infer that she is witnessing a production in the Naturalistic style (as opposed to a Brechtian style, for example) based only on the acting and *mise en scene* she experiences. She is not limited only to asking and making guesses about what happens next but also can assist herself in that very task because she is also able to infer what *kind* of production she is experiencing from *the same data* she uses to form a prediction about what will happen next.

However, this entry has been primarily a contribution only to the second part of a full theory, namely, an account of how attendants pay attention to and have their attention captured by performances, based on the agreed-upon facts about attention and on the signalling game model. The following two questions remain. To what do spectators attend? and what is their manner of attention? So, in conclusion, I will now venture suggestions for how we might respond to them.

### III. The attention of audiences

First, attention to features of performers and to the *mise en scene* generates the collected ‘data streams’ from which attendants draw their inferences. Features become salient to an attendant just when the learner-attendant, under a suitable common knowledge requirement, can notice those features as regularities in the behaviour of the performer or the presented environment (Hamilton 2007, 91–113). What is salient for the attention of a spectator will, naturally, depend on her level of familiarity and expertise with theatrical performances. She may be able to foresee certain features because she has been appropriately backgrounded for it (Saltz 2006). But she may be entirely a novice, unable to rely on effective prior beliefs and thus unable to foresee those features. Nevertheless, in both cases, and since most of the regularities that attendants are interested in primarily are regularities of actions, I believe it is *primarily* features of actions that audiences attend to (Shepard 1971; Schachner and Carey 2013; Novack and Goldin-Meadow 2016).

Secondly, consider the behaviour of someone attending to the sick or attending to a lover. Those behaviours provide useful analogies for understanding the manner in which a receiver-spectator attends. Even though some of this behaviour is not at all relevant to this issue, some is highly relevant.

- 1 Attending in these cases involves listening and watching for – *searching for* – certain kinds of features that are appropriately related to the tasks of grasping and responding affectively to the behaviour of others. The results of laboratory studies suggest that the specifics of a subject’s task are crucial to the subject’s feature searches (Joseph, Chun, and Nakayama 1997; Kiss et al. 2014). And theatre and performance practitioners have long known that attendants must actively search for what to attend to in the behaviour of performers in order to make sense of it. In this, they are guided both by performers and their own past experiences.

- 2 Attending in these cases requires being prepared to respond to that for which one has been listening and watching. Moreover, the forms of that preparedness to respond and the responses themselves are usually physical or active in some way. Audience members squirm, grimace, guffaw or wince when, for example, they believe a character is about to do something stupid, they often lean forward in anticipation of bad people getting their just desserts and they occasionally cry for the losses characters suffer. Spectators react physically to images, events, characters, their traits and conduct, often without self-awareness. A character may be felt to be in a stronger position in the story simply because the performer is positioned on stage in a particular way. And, unless the attendant is sufficiently cognisant of the relevant bits of stagecraft, she will be completely unaware of how that response to the character was occasioned (Hamilton 2007).
- 3 Then there is usually a physical effect on the person who is the object of attention. For two simple but powerful examples, being attended to can trigger approval-seeking behaviour or it can determine where people look (van Rompay, Vonk and Frasen 2009; Risko and Kingstone 2011). That is, the effects can also signal back something to the original signaler (Skrms 2010). Some acting styles – such as Brecht’s perhaps – aim to exploit this very natural reaction (Rouse 1984). Others – such as Naturalism – aim to suppress it (Stanislavski 1980, 84). This helps explain what *performers* must do, given their stylistic choices, when they are attended to.

## References

- Awh, Edward, Artem V. Belopolsky, and Jan Theeuwes. 2012. ‘Top-Down versus Bottom-Up Attentional Control: A Failed Theoretical Dichotomy’. *Trends in Cognitive Sciences* 16(8): 437–43.
- Blair, Rhonda. 2010. ‘Acting, Embodiment, and Text: Hedda Gabler and Possible Uses of Cognitive Science’. *Theatre Topics* 20(1): 11–21.
- Borji, Ali, Dicky N. Sihite, and Laurent Itti. 2012. ‘An Object-Based Bayesian Framework for Top-Down Visual Attention’. *Association for the Advancement of Artificial Intelligence* 1529–35.
- Chaikin, Joseph. 1980. *The Presence of the Actor*. New York: Atheneum.
- Chikkerur, Sharat, Thomas Serre, Cheston Tan, and Tomaso Poggio. 2010. ‘What and Where: A Bayesian Inference Theory of Attention’. *Vision Research* 50: 2233–47.
- Chun, Marvin M., Julie D. Golomb, and Nicholas B. Turk-Browne. 2011. ‘A Taxonomy of External and Internal Attention’. *The Annual Review of Psychology* 62: 73–101.
- Clark, Andy. 2013. ‘Whatever Next? Predictive Brains, Situated Agents, and the Future of Cognitive Science’. *Behavioral and Brain Sciences* 36: 181–253.
- Clark, Andy. 2015. ‘Radical Predictive Processing’. *The Southern Journal of Philosophy* 53 (Special Supplement): 3–27.
- Cohn, Neil, and Eva Wittenberg. 2015. ‘Action Starring Narratives and Events: Structure and Inference in Visual Narrative Comprehension’. *Journal of Cognitive Psychology* 27(7): 812–28.
- Creem-Regehr, Sarah H., and Benjamin R. Kunz. 2010. ‘Perception and Action’. *Reviews in Cognitive Science* 1: 800–810.
- Daunizeau, Jean, Hanneke E. M. den Ouden, Matthias Pessiglione, Stefan J. Kiebel, Karl J. Friston, and Klaas E. Stephan. 2010. ‘Observing the Observer (I): Meta-Bayesian Models of Learning and Decision-Making’. *PLoS One* 5(12): 1–19.
- di Benedetto, Stephen. 2007. ‘Guiding Somatic Responses within Performative Structures’. In *The Senses in Performance*, edited by Sally Banes and Andrew Lepecki, 124–134. New York: Routledge.
- de Bruin, Leon, and John Michael. 2017. ‘Prediction Error Minimization: Implications for Embodied Cognition and the Extended Mind Hypothesis’. *Brain and Cognition* 112: 58–63.
- Feldman, Harriet, and Karl J. Friston. 2010. ‘Attention, Uncertainty, and Free-Energy’. *Frontiers in Human Neuroscience* 4: 1–23.
- Friston, Karl. 2009. ‘The Free-Energy Principle: A Rough Guide to the Brain?’ *Trends in Cognitive Science* 13(7): 293–301.



- Friston, Karl. 2012. 'Prediction, Perception, and Agency'. *International Journal of Psychophysiology* 83: 248–52.
- Friston, Karl, Jean Daunizeau, James Kilner, and Stefan J. Kiebel. 2010. 'Action and Behavior: A Free-Energy Formulation'. *Biological Cybernetics* 102: 227–260.
- Friston, Karl, Rick A. Adams, Laurent Perrinet, and Michael Breakspear. 2012. 'Perceptions as Hypotheses; Saccades as Experiments'. *Frontiers in Psychology* 3: 1–20.
- Friston, Karl, Philipp Schwartenbeck, Thomas FitzGerald, Michael Moutoussis, Timothy Behrens, and Raymond J. Dolan. 2013. 'The Anatomy of Choice: Active Inference and Agency'. *Frontiers in Human Neuroscience* 7(article 598): 1–18.
- Glymour, Bruce. 2000. 'Data and Phenomena: A Distinction Reconsidered'. *Erkenntnis* 52: 29–37.
- Goodman, Noah D., Tomer D. Ullman, and Joshua B. Tenenbaum. 2011. 'Learning a Theory of Causality'. *Psychological Review* 118(1): 110–9.
- Hamilton, James R. 2007. *The Art of Theater*. Hoboken, NJ: Wiley-Blackwell.
- Hamilton, James R. 2013. 'Acting'. *The Journal of Dramatic Theory and Criticism* 28(1): 35–59.
- Hamilton, James R. 2015. 'Notes toward a Theory of Spectating'. *The Journal of Dramatic Theory and Criticism* 29(2): 105–25.
- Hayhoe, Mary M., Anurag Shrivastava, Ryan Mruzek, and Jeff B. Pelz. 2003. 'Visual Memory and Motor Planning in a Natural Task'. *Journal of Vision* 3: 49–63.
- Hickey, Clayton, Wieske van Zoest, and Jan Theeuwes. 2010. 'The Time Course of Exogenous and Endogenous Control of Overt Attention'. *Experiments in Brain Research* 201: 789–96.
- Hohwy, Jakob. 2012. 'Attention and Conscious Perception in the Hypothesis Testing Brain'. *Frontiers in Psychology* 3: 1–14.
- Hunt, Amelia R., and Alan Kingstone. 2003. 'Covert and Overt Voluntary Attention: Linked or Independent?' *Cognitive Brain Research* 18: 102–5.
- Ide, Jaime S., Sheng Zhang, and Chiang-shan R. Li. 2014. 'Bayesian Network Models in Brain Functional Connectivity Analysis'. *International Journal of Approximating Reason*, 56(Part 1): 1–26.
- Itti, Laurent, and Ali Borji. 2015. 'Computational Models: Bottom-Up and Top-Down Aspects'. *arXiv* 3(7): 1–30.
- Itti, Laurent, and Christof Koch. 2001. 'Computational Modeling of Visual Attention'. *Nature Reviews Neuroscience* 2: 1–11.
- Johnstone, Ollie, and Frank Thomas. 1995. 'The Principles of Animation'. In *Disney Animation: The Illusion of Life*, 47–69. New York: Hyperion.
- Joseph, Julien S., Marvin M. Chun, and Ken Nakayama. 1997. 'Attentional Requirements in a "Preattentive" Feature Search Task'. *Nature* 387: 805–7.
- Kiss, Monicka, Anna Grubert, Anders Petersen, and Martin Eimer. 2012. 'Attentional Capture by Salient Distractors during Visual Search Is Determined by Temporal Task Demands'. *Journal of Cognitive Neuroscience* 24(3): 749–59.
- Krauzlis, Richard J., Anil Bollimunta, Fabrice Arcizet, and Lupeng Wang. 2014. 'Attention Is an Effect Not a Cause'. *Trends in Cognitive Science* 18(9): 457–64.
- Kuhn, Steven L. 2014. 'Signaling Theory and Technologies of Communication in the Paleolithic'. *Biological Theory* 9: 42–50.
- Land, Michael F., and Peter McLeod. 2000. 'From Eye Movements to Actions: How Batsmen Hit the Ball'. *Nature Neuroscience* 3: 1340–5.
- Lavie, Nilli, Aleksandra Hirst, Essi Viding, and Jan W. de Fockert. 2004. 'Load Theory of Selective Attention and Cognitive Control'. *Journal of Experimental Psychology, General* 133(3): 339–54.
- Levin, Daniel T., and Daniel J. Simons. 1997. 'Failure to Detect Changes to Attended Objects in Motion Pictures'. *Psychonomic Bulletin & Review* 4(4): 501–6.
- Li, Junning, Z. Jane Wang, Samantha J. Palmer, and Martin J. McKeown. 2008. 'Dynamic Bayesian Network Modeling of fMRI: A Comparison of Group-Analysis Methods'. *NeuroImage* 41: 398–407.
- Mack, Arien. 2002. 'Is the Visual World a Grand Illusion? A Response'. *Journal of Consciousness Studies* 9(2): 102–10.
- McConachie, Bruce. 2014. 'All in the Timing: The Meanings of *Streetcar* in 1947 and 1951'. In *The Theatre of Tennessee Williams*, edited by Brenda Murphy and Kevin J. Wetmore Jr., 181–204. London: Bloomsbury Methuen Drama.
- Nanay, Bence. 2010. 'Action-Oriented Perception'. *European Journal of Philosophy* 20(3): 430–46.
- Nanay, Bence. 2016. *Aesthetics as Philosophy of Perception*. Oxford: Oxford University Press.

- Noë, Alva. 2007. 'The Critique of Pure Phenomenology'. *Phenomenological Cognitive Science* 6: 231–45.
- Novack, Miriam A., and Susan Goldin-Meadow. 2017. 'Gesture as Representational Action: A Paper about Function'. *Psychonomic Bulletin & Review* 24: 652–65.
- Perfors, Amy, Joshua B. Tenenbaum, Thomas L. Griffiths, and Fei Xu. 2011. 'A Tutorial Introduction to Bayesian Models of Cognitive Development'. *Cognition* 120(3): 302–21.
- Pollock, Frank E., Helena M. Paterson, Armin Bruderlin, and Anthony J. Sanford. 2001. 'Perceiving Affect from Arm Movement'. *Cognition* 82: B51–B61.
- Ranciere, Jaques. 2009. *The Emancipated Spectator*. Translated and edited by Gregory Elliott. London: Verso.
- Risko, Evan F., and Alan Kingstone. 2011. 'Eyes Wide Shut: Implied Social Presence, Eye Tracking and Attention'. *Attention, Perception, & Psychophysics* 73: 291–6.
- Rouse, John. 1984. 'Brecht and the Contradictory Actor'. *Theatre Journal* 36(1): 25–42.
- Saltz, David. 2006. 'Infiction and Outfiction'. In *Staging Philosophy: Intersections of Theater, Performance, and Philosophy*, edited by David Krasner and David Saltz, 203–20. Ann Arbor: University of Michigan Press.
- Schachner, Adena, and Susan Carey. 2013. 'Reasoning about "Irrational" Actions: When Intentional Movements Cannot Be Explained, the Movements Themselves are Seen as the Goal'. *Cognition* 129: 309–27.
- Shepard, Richmond. 1971. 'What Is Mime About?' In *Mime: The Technique of Silence*. New York: Drama Book Specialists.
- Simons, Daniel J., and Daniel T. Levin. 1997. 'Change Blindness'. *Trends in Cognitive Science* 1(7): 261–7.
- Simons, Daniel J., and Daniel T. Levin. 1998. 'Failure to Detect Changes to People during a Real-World Interaction'. *Psychonomic Bulletin & Review* 5(4): 644–9.
- Skyrms, Brian. 2010. *Signals: Evolution, Learning, and Information*. Oxford: Oxford University Press.
- Stanislavski, Konstantin. 1980. *An Actor Prepares*, 2nd ed. Translated and edited by Elizabeth Hapgood. London: Methuen.
- Tatler, Benjamin W., Mary M. Hayhoe, Michael F. Land, and Dana H. Ballard. 2011. 'Eye Guidance in Natural Vision: Reinterpreting Saliency'. *Journal of Vision* 11(5): 1–23.
- Toole, William B. 1978. 'Psychological Action and Structure in *Richard II*'. *The Journal of General Education* 30(3): 165–84.
- Yu, Angela J., and Peter Dayan. 2005a. 'Uncertainty, Neuromodulation, and Attention'. *Neuron*, 46: 681–92.
- Yu, Angela J., and Peter Dayan. 2005b. 'Inference, Attention and Decision in a Bayesian Neural Network'. In *Advances in Neural Information Processing Systems 17*, edited by L. K. Saul, Y. Weiss, and L. Bottou, 1577–84. Cambridge, MA: MIT Press.
- Van Rompay, Thomas J. L., Dorette J. Vonk, and Marieke L. Fransen. 2009. 'The Eye of the Camera: Effects of Security Cameras on Prosocial Behavior'. *Environment and Behavior* 41: 60–74.
- Wu, Wayne. 2011. 'Attention as Selection for Action'. In *Attention: Philosophical and Psychological Essays*, edited by Christopher Mole, Declan Smithies and Wayne Wu. Oxford: Oxford University Press, 97–116.
- Zelinsky, Gregory, Wei Zhang, Bing Yu, Xin Chen, and Dimitris Samaras. 2005. 'The Role of Top-Down and Bottom-Up Processes in Guiding Eye Movements during Visual Search'. In (NiPS 18) *Advances in Neural Information Processing Systems*, edited by Y. Weiss, B. Scholkopf, and J. Platt, 1569–76. Cambridge, MA: MIT Press.
- Zhao, Jiaying, Naseem Al-Aidroos, and Nicholas B. Turk-Browne. 2013. 'Attention Is Spontaneously Biased Toward Regularities'. *Psychological Science* 24(5): 667–677.
- Zhang, Liming, and Weisi Lin. 2013. *Selective Visual Attention: Computational Models and Applications*. Singapore: Wiley-IEEE Books.