"Black Box" Theatre
Second-Order Cybernetics and Naturalism in Rehearsal and Performance

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> Context • The thoroughly second-order cybernetic underpinnings of naturalist theatre have gone almost entirely unremarked in the literature of both theatre studies and cybernetics itself. As a result, rich opportunities for the two fields to draw mutual benefit and break new ground through both theoretical and empirical investigations of these underpinnings have, thus far, gone untapped. **> Problem** • The field of cybernetics continues to remain academically marginalized for, among other things, its alleged lack of experimental rigor. At the same time, the field of theatre studies finds itself at an impasse between post-structuralist semioticians and embodied cognitivists regarding key onto-epistemological issues. A program of research framing and utilizing naturalist theatre as a second-order cybernetic/cybersemiotic laboratory holds much promise in addressing both matters and lending credence to Ross Ashby's assertion that "the discovery that two fields are related leads to each branch helping in the development of the other." **> Method** • After establishing the nature of the onto-epistemological deadlock within theatre studies, this article examines the application of cybernetic heuristics within naturalistic theatre, leading to a second-order cybernetic analysis of its processes of production and reception and the outline of an experimental program for exploring these processes further. **> Results** • Foundations for a model of naturalist theatre as a cybersemiotic laboratory grounded in a novel operationalization of Gordon Pask's conversation theory. **> Implications** • The proposed laboratory could result in the generation of quantitative and qualitative research pertaining to several dimensions of second-order cybernetics; particularly cybersemiotics, which, as a result, may end up better positioned to help dissolve onto-epistemological deadlocks between constructivists and realists of all stripes across the academy and beyond. **> Constructivist content** • I argue that an analysis of naturalistic theatre's processes of meaning-making filtered through the constructivist ontological agnosticism of second-order cybernetics offers a productive middle way forward for those on both sides of the social constructivist/embodied cognitive realist divide, within and beyond theatre studies. The article draws upon the works of Gregory Bateson, Søren Brier, Ranulph Glanville, Heinz von Foerster, and Niklas Luhmann. **> Key words** • Naturalism, eigenbehaviours, conversation theory, entailment structures.

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Introduction

« 1 » Whether in print or in person, when highlighting the importance of James Clerk Maxwell's "black box" *gedanken-experiment* to his own work, Ranulph Glanville would often playfully gesture to the black box theatre (a simple, flexible, unadorned performance space with a flat floor and no proscenium arch) as decidedly not the kind of Black Box to which he was referring. It is with a similar mix of playfulness and earnestness (and as a small but heartfelt memorial to his enormous contributions) that I gesture back to the theatrical black box as precisely the place where that other kind of Black Box might be fruitfully investigated.

« 2 » As a practitioner and teacher of acting and directing for the theatre, the theory explicated herein was inspired by the growth of my engagement with cybernetics to include not only my initial "first-order" concerns with the ways in which, through rigorously applied cybernetic heuristics, the Stanislavski system of acting can consistently generate "believable" performances (Scholte 2015), but also "second-order" questions regarding the mechanisms through which observers (audiences) assign this sense of "belief," as well as "meaning," to these performances. The result is the theoretic formulation below, which will be experimentally investigated and analysed over the next several years.

« 3 » At all phases of the work as it has unfolded, the list of its second-order cybernetic implications has continued to grow and, along with it, my nascent belief that not only could second-order cybernetics bridge theoretical gaps between post-structuralists and cognitivists within theatre studies, but that naturalist theatre (along with related offshoots including Theatre of the Oppressed and psychodrama) could provide a hitherto untapped laboratory for the generation of quantitative and qualitative research pertaining to several dimensions of second-order cybernetics,[1] particularly cy-

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1 | One reviewer suggested that cybernetics, if it is indeed a science at all, is inductive rather

bersemiotics, which, as a result, might end up better positioned to help dissolve onto-epistemological deadlocks between constructivists and realists of all stripes across the academy and beyond.[2] In my view, this represents a significant new approach to second-order research, indicating that, fifty years after its inception, the theoretical advances of second-order cybernetics are not only continuingly relevant, but, in vast areas of the humanities, still to be explored. My hope is that the theoretical considerations discussed here might inspire others to bring their expertise to this fledgling research program.

« 4 » I will begin by outlining the current, hotly debated onto-epistemological deadlock in theatre studies that has been the backdrop against which my work has been carried out. I will then introduce the cybernetic fundamentals of the Stanislavski system of acting (the methodology most commonly employed in the rehearsal and performance of naturalistic plays). I will then further excavate the second-order cybernetic depths of naturalist theatre's methods of production and reception while proposing ways in which second-order cybernetics might be operationalized, through the application of elements of Gordon Pask's conversation theory (CT), as a cybersemiotic intervention in the aforementioned dispute within theatre studies as well as other similar outstanding questions across the humanities and social sciences. Conversely, it is my hope that the employment of the natu-

than empirical and is, therefore, under no obligation to run laboratory experiments. This and other conceptions of the disciplinary status of the field, including Gordon Pask's eventual disavowal of the label "science" in favor of "applied epistemology" (Pask 1980b) and Lowell Christy's recent comment to me that the field's difficulties establishing an institutional home for itself are due, in part, to the fact that it is actually an "anti-discipline," certainly deserve consideration.

2| There is, of course, nothing like a total embrace of cybersemiotics amongst cyberneticians, but its insistence on the role of observer-dependent onto-epistemology in the interpretation and description of both symbolic and non-symbolic phenomena makes it sufficiently compatible with other strands of second-order research to be of wide experimental usefulness across the field.

ralist theatre as a "research site" might help the field of second-order cybernetics further refine its theoretical foundations lending credence to Ross Ashby's assertion that "the discovery that two fields are related leads to each branch helping in the development of the other" (Ashby 1956: 4).

The impasse in theatre studies

« 5 » A "Cognitive Turn" has swept through theatre studies, along with many other disciplines within the humanities, during the opening decades of the 21st century. The previous era of high postmodernism had been a dangerous time for any scholar willing to make a statement even remotely resembling some kind of universal truth-claim, and this had been the case particularly for university-based teachers of the Stanislavski system of acting, grounded, as it is, in 19th century notions of the "self" and the "truth of the human spirit" (Stanislavski 2008: 19).

« 6 » In terms of theatrical practice as a whole, the genre of realism, the performance mode most often conflated with the theoretical commitments of naturalism, and where Stanislavski's methods have traditionally been most at home, had been hit particularly hard. Considered "cranky, weary, old-fashioned, prescriptive, middle-class, and formulaic," realism is described by Amy Holzapfel as "one of the most berated dramatic forms within contemporary theory," and as commonly considered "a conservative force that reproduces and reinforces dominant cultural relations" (Holzapfel 2014: 5).

« 7 » Regarding the Stanislavski system in particular, an early paper by Rhonda Blair vividly diagnoses its American descendent, "the Method," as a similar casualty of the critical theoretic onslaught; pilloried for its reification of "a non-existent "self"" and accused of "colluding in mechanisms of representation that serve the ends of decadent late capitalism," its "ahistorical, noncritical, sentimentalized or sensationalized view of experience" is said to participate in a dubious "humanist project of universalizing experience" that is "inherently patriarchal and misogynist" (Blair 2000: 202).

« 8 » But, as the new millennium dawned, a cluster of theatre scholar/practitioners, frustrated by the fact that "few scholars in [the] field have asked the advocates of Bordieu, Lacan, and Derrida […] to justify the epistemology of their theories on scientific grounds" (McConachie 2008: 9), grabbed hold of cognitive science as a means of "defying the sceptical paralysis that characterizes much of postmodern thought" (Rokotnitz 2011: 5) and rebuilding our ability to "trust performance." Undergirding this view is the belief that "[e]mbodied modes of reception and perception are those that do not require logical analysis for their verification; their presence and effects are made manifest in the body" and that this bodily apprehension and confirmation provides us with "truths of which we may be sufficiently satisfied in order to trust with confidence" (ibid: 2).

« 9 » Regarding Stanislavski's position in this reappraisal, the early days of the movement saw Blair offer the thoroughly isomorphic relationship between the Method's terminology and that of the computational theory of mind as a potential arrow in the quiver of the theatrical cognitivists.

"Behavior that is adaptive is designed to accomplish or prevent something or to achieve a goal, which is *action* in the Method's sense. 'Opportunities' and 'constraints' defined by 'other people's behavior' are analogous with [the Method's] 'objectives,' 'obstacles' and 'given circumstances.' From this perspective, key parts of the Method are fundamentally Darwinian and biological, not necessarily Romantic, modernist, humanist, psychological, Western, and spiritual. If this theory is correct, it means that the appeal of the method is due not necessarily (and only) to the hegemony of various kinds of realism and habits of representation and mimesis but to the fact that this is how we function organically. From this perspective, self and behavior are grounded in our being as physical organisms while also being affected by culture and conscious choice." (Blair 2000: 206)

« 10 » The obvious short step from the computational theory of mind to the goal-directed and feedback-controlled conception of cybernetics, and its place within a unified theory of human behavior (see Grinker 1958), could, potentially, position the field to play its own role in the cognitive turn and its insistence that…

"while doubt is necessary for rigorous analysis, and essential for the advancement of intelligent inquiry, art and drama can also teach us of other forms of knowing that are no less valid, rigorous, or true." (Rokotnitz 2011: 12)

« 11 » But, while the notion that art and drama may provide access to "other […] no less valid […] forms of knowing" is appealing, the notion that such forms of knowing might be "true" speaks of a desire for the kind of ontological certainty that is the hallmark, and blind-spot, of first-order science (and, for that matter, first-order cybernetics). And it would, in my view, be most unfortunate if this blind-spot were to prove the very undoing of the cognitive turn, as the movement offers an opportunity to confront certain persistent phenomena that have not been satisfactorily explained away by a strictly social constructivist semiotic approach.

« 12 » Many theatre practitioners continue to work with notions of "truth" in performance, along with a sustained belief that representational drama in the realist/naturalist tradition can contain genuine epistemic goods. Arguably, a large percentage of mainstream theatre audiences would agree, at least tacitly, with this notion. Countless acting students are routinely stunned by the sudden emergence of "truthful" behaviour under imaginary circumstances when their colleagues first begin to effectively execute the cybernetic principles of the Stanislavski system. Peer reflections inevitably include such comments as: "It was great to hear you use your real voice instead of your acting voice," "I've never seen your movements and your gestures seem so natural," "It was just like watching you being yourself in that situation except the words weren't the words you would use." But, of course, these accounts have long been inadmissible as "evidence" in the postmodern court of opinion since words such as "real," "natural," and "self" have been effectively stricken from the record. They are, of course, similarly suspect in second-order cybernetic discourse. So what are we to make of the persistent phenomena attested to daily in classrooms and professional rehearsal halls throughout the Anglo-American and European world for more than a century? What can we say about this difference between acting that is commonly called "good" and that which is

called "bad" and that seems to have something to do with a kind of relationship to the behaviour we recognize from our everyday observations and that is fairly dependably produced by the application of cybernetic principles to the world of "make-believe"?

« 13 » Semiotically-minded theatre scholars such as Ric Knowles have already pushed back against the "proselytising […] excesses of [the cognitive turn's] still early days" and declared the phenomenological "lack of mediation" it vouches for to be "a theoretical ideal rather than a practical possibility" (Knowles 2015: 83–87). Interestingly, Knowles's defence of semiotics' alleged "unscientific errors" also gestures towards its integration with "biological structuring" in the work of Jakob von Uexküll, a scientist whose biosemiotics have also played such a pivotal role in Søren Brier's cybersemiotic formulation. This seems to set the stage nicely for a second-order intervention that might provide a productive "middle way" between these two contesting camps in theatre studies.

Stanislavski's cybernetic system

« 14 » Scholte (2015) examines, in some detail, the essentially cybernetic vision at the core of the Stanislavski system of acting, first highlighted by Robert Cohen, who begins his explanation with the most often cited example of cybernetics in action: the thermostat on a regulated furnace that is, of course, "calibrated to go on when feedback reveals the room temperature is too low, and to go off when feedback reveals the opposite" (Cohen 1978: 33).

« 15 » Cohen then points out that, in order to provoke her own organic responses on a moment-to-moment basis in performance, the actor must remain responsive to the feedback emanating from her fellow actors that will let her know whether she, like the regulated furnace, is getting closer to, or further from, the "objective" that she, in orthodox Stanislavskian practice, has chosen for her character to pursue throughout the scene (i.e., soliciting a declaration of love).

"This feedback includes not only conscious dialogue and conscious non-verbal signals like winks

and shrugs but also the unconscious and autonomic responses of our physiology; behaviours of which we (as humans) are skilled observers and interpreters. They are all part of the feedback of information which makes us adjust our behaviour toward the satisfaction of our intentions – and sometimes to adjust our intentions as well." (1978: 36)[3]

« 16 » Guided by this feedback, characters create what engineers would describe as "closed loop" control systems as they mutually seek to influence each other's behaviour. The mental discipline to remain genuinely engaged in such loops within imaginary circumstances lies in direct correlation to the seeming "naturalness" of performance that is the hallmark of great Stanislavskian, or Method, acting.

Active Analysis: An ordinary language description

« 17 » Nowhere did Stanislavski harness the power of his cybernetic approach to acting more productively than in the rehearsal methods known as his "later legacies" including Active Analysis (AA). Bella Merlin outlines the process of AA as follows:

"First of all, the actors read the scene. Second, they assessed the facts of the scene… What is the event? What are the inciting objectives and counter-objectives? […] The third stage consisted of the actors improvising the scene using their own words, incorporating any of the facts that they could remember. […] Following the improvisation, the actors reread the scene and compared it with what they had just experienced. They noted which facts were retained and which were forgotten, and whether the inciting incident took place. Rehearsing […] consisted of repeating this four-stage process. […] With each new improvisation, the actors strove to add more details of events, language, and images… The fifth and final stage involved memorizing the scene… In fact, if the improvisational work had been successful, they

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3 | Of course, unlike the furnace, as an organism that learns and also exercises "theory of mind," the feedback to which the actor/character responds will be continuously contextualized by the moment-to-moment predictions she is making regarding the other characters' behavior.

found that the scene had virtually 'learned itself.'" (Merlin 2003: 34f)

« 18 » This initial process is meant to last for the first two thirds of the total allotted rehearsal time. In the final third, the director engages in the more traditional work of formalizing ("blocking") the final staging of the show; setting the actors' physical movements, tempos, and rhythms so that "the words of the dialogue, contained in the text, are scattered through and inscribed in the time and place of the stage" in such a way as to "make the deep meaning of the dramatic text tangibly evident" (Pavis 1998: 364). The more or less conventional gestural, proxemic, illocutionary, and temporal semiotic codes she employs to do so comprise what has become known as the "performance text" as distinct from the "dramatic text" comprised of the author's written word (Elam 1988: 3). In shaping this text, the director initiates an additional control loop that remains open when she is satisfied with what is unfolding on stage and that she closes periodically in order to modify the performances to her satisfaction.

« 19 » According to Merlin, the fact that actors participating in AA "[were] starting from *themselves*" allowed them to "kick-start the creative process into action" in a manner that pays off in "profound effects both in rehearsal and in performance" as "the sense of improvisation is carried all the way from first preview to last night" requiring "no 'creative' force or impossible demands" (Merlin 2003: 35). After observing Stanislavski's Moscow Art Theatre in rehearsal, Norris Houghton corroborates this claim indicating that the powerful connection between actor and character forged in early rehearsals remains unbroken by the director's later interventions and that "once it is achieved, the director can in a fairly short time add shape to the performance and not disturb the actor in so doing" (Houghton 1962: 80f).

Beginnings

« 20 » In May of 2015 I undertook an experiment, in collaboration with Alan Kingstone of the UBC Department of Psychology, to explore the potential impacts of the AA rehearsal method (seldom, if ever, employed in professional North American theatre practice for reasons discussed in Scholte 2010) upon audiences. Two actors rehearsed and performed David French's naturalist drama *Salt-Water Moon* under my direction, employing the AA rehearsal process. The play portrays an encounter on a single evening in August of 1926 in which a young man returns to his hometown in rural Newfoundland to try and win back the girl he left behind when he suddenly fled to Toronto without a word a year previous. Following the completion of the first two thirds of the process, audiences were invited to view four performances of the entire piece in which the actors adhered to the author's written text while the performance text was still allowed to unfold autopoietically each night based solely on the actors' emergent and self-organizing cybernetic response. The final third of rehearsal, in which I, as director, fixed an allopoietic performance text, was then completed followed by a further four performances for invited audiences. At all eight performances, data on the audience's qualitative appraisal of the "truthfulness" and "believability" of the actor's performances,[4] as well as overall satisfaction with the performance, was gathered through the use of Likert scale questionnaires. Additionally, data regarding audience interpretation of the piece as a whole was gathered using a method Kingstone had previously developed and employed in a study of film audience responses (see Coleman et al. 2013).

« 21 » Participants are asked to press a button on a mobile clicker when the action is found to be "meaningful." Observers press and hold down the key and let go when the moment ends. Any segment of action during which multiple participants held down their buttons simultaneously is deemed a moment of "convergence." We hypothesized that audiences would indicate a greater

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4| While the dialogue in certain plays may be more "heightened," or stylized, than everyday speech (even within the realm of naturalism), the indicators of "believability" found in vocal tone, body language, and dynamics remain constant. We are particularly impressed when a gifted actor achieves such an effect in, for instance, a performance of Shakespeare.
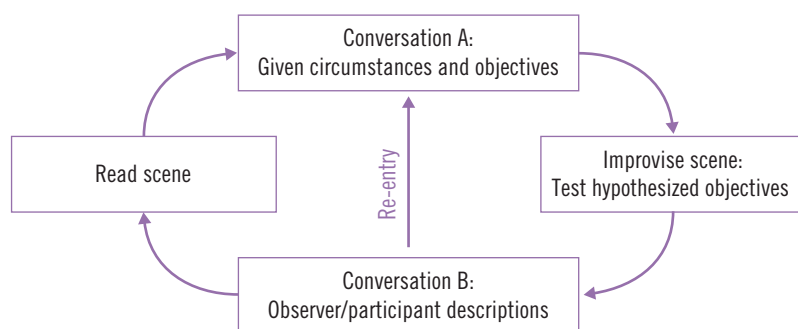
sense of "believability," with fewer moments and lower levels of "convergence" around "meaning," in the autopoietic performances. The difference in degree of "audience satisfaction" with these two models remained an open question at the very heart of this experiment, the answer to which would lead to further hypothesizing as to the expectations and desires of theatrical audiences.

« 22 » Detailed analysis of the copious data generated by this experiment is ongoing and will, ultimately, be presented in a separate article co-authored with my collaborator, Dr Kingstone. But it was during the rehearsal of the production itself that the second-order cybernetic underpinnings of the AA process came into sharper focus for me, suggesting a potential new direction for this type of inquiry that could, through the additional deployment of elements of CT, shift future experiments onto a firmly cybersemiotic footing. The explication of this notion, which will make up the remainder of this article, must begin by re-examining the process of AA itself through a distinctly second-order cybernetic lens.

Active Analysis: A conversation theoretic description

« 23 » Figure 1 illustrates the circular nature of the first two thirds of the AA process and indicates the recursive re-entry of observations as it cycles through its successive iterations. We will examine each component of this process in some detail, highlighting the second-order cybernetic considerations implicit in their procedures and suggesting ways in which they may be made more explicit, and analytically useful, through the application of CT.

« 24 » When a production team of actors, designers, and director begins its work, its members must confront a formal object that is both a result and embodiment of second-order observation: the playwright and his/her text. Before examining the subsequent operations taking place within the rehearsal process, it is necessary to spend some time framing the naturalistic play text itself in second-order cybernetic terms.

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Figure 1 • Active Analysis: A conversational theoretic diagram.

The naturalistic play as a Black Box

« 25 » In Glanville's view, Maxwell's Black Box *Gedankenexperiment* provided "one of the greatest inventions of human thinking, because it allows us to develop understandings of the universe without having to claim we know what it's made up of or that we have access to actual mechanisms, emphasizing that our descriptions are descriptions, not to be confused with actuality." He defines this "fantas[tical]" (i.e., wholly imaginary) conceptual tool as follows.

❝In its simplest form, the Black Box is taken to be a virtual input/output machine. A signal is input, the output observed, and then another signal (usually the most recent output) is input, producing another output – and so on. What is observed is the behaviour of this input/output machine. The collection of observations is itself observed, so we may construct a pattern. When we have constructed such a pattern, we are inclined to say that we know what the Black Box does, and that it is now 'white'.❞ (Glanville 2012: 421)

« 26 » Swept up by the explanatory promise of late 19th century Darwinian science (particularly as developed in the writings of Hippolyte Taine (Pickering & Thompson 2013: 15)), the program of literary naturalism (still, arguably, the most prominent dramatic genre of the present day) sought to bring a rigorous analysis of heredity and environment to bear upon works of the imagination in the hopes that they might play a role in diagnosing psychological and social pathologies. The movement's most prominent early proponent, novelist, essayist and playwright, Emile Zola, expressed the movement's aims in the following terms:

❝[T]o possess a knowledge of the mechanism of the phenomena inherent in man, to show the machinery of his intellectual and sensory manifestations, under the influences of heredity and environment, such as physiology shall give them to us, and then finally to exhibit man living in social conditions produced by himself, which he modifies daily, and in the heart of which he himself experiences a continual transformation.❞ (Zola 1893: 649)

« 27 » Of particular note here, from a cybernetic perspective, is the invocation of the term "mechanism" to denote some set of functions within man responsible for generating the phenomena that are "give[n]" to the observer through behavioral effects in the "physiology" of the individual(s) under observation, as well as the acknowledgement of a circular rather than linear causal relationship between the modifications of both man and his "social conditions." The latter insight indicates a nascent systems perspective inherited directly by Zola from his primary scientific role model, Claude Bernard. Pre-echoes of what might be characterized as a proto-systems theoretic viewpoint can be found throughout Zola's naturalist manifesto and even foreshadows notions of both biological and social autopoiesis (Zola 1893: 650).

« 28 » As an example of the "experimental novelist" at work, Zola points to his countryman Honoré de Balzac's portrait of the character Baron Hulot in his 1846 work, *Cousin Bette.*

❝The novelist starts out in search of a truth.[…] The general fact observed by Balzac is the ravages that the amorous temperament of a man makes in his home, in his family, and in society. As soon as he has chosen his subject he starts from known facts, then he makes his experiment, and exposes Hulot to a series of trials, placing him amid certain surroundings in order to exhibit how the complicated machinery of his passions works.❞ (Zola 1893: 647)

« 29 » Zola's employment of the term "experiment" to describe the operations performed by the author is obviously dubious. There is clearly no actual individual who is being placed within "certain surroundings" in order that his subsequent behaviours may be observed. What the author is providing, rather, is a hypothesised pattern of behaviour that an individual possessed of certain proposed psychological mechanisms would, in the author's view, be likely to exhibit. Zola, essentially, acknowledges as much.

❝The idea of experiment carries with it the idea of modification. We start, indeed, from the true facts, which are our indestructible basis; but to show the mechanism of these facts it is necessary for us to produce and direct the phenomena; this is our share of invention, here is the genius in the book.❞ (Zola 1893: 647)

« 30 » Despite the overblown sense of ontological certainty explicit in Zola's language, the idea that the "indestructible basis" of this imaginative elaboration are the "true facts" previously "observe[d]" by the author in the course of his societal interactions and that, furthermore, the elaboration itself is intended to "show the mechanism of these facts" renders the naturalist novel or play (as well as each of the characters with which it is populated) a type of Black Box – again, as defined by Glanville – invoked by the author, who, having observed an "unclear […] mess" that, nonetheless, appears to be "some action which [one] might be able to call behaviour," and applied as an "ordering concept" allowing "the unclear chaotic mess" to be "(re)constructed as behaviours associated with an input-output machine, where the machine is the Black Box (the home of the mechanism" (Glanville 2009a: 153).

« 31 » The Black Box that is the naturalistic play is now confronted by the production team in a further process of second-order analysis implicit in Conversation A.

Conversation A

Play analysis as cybernetic explanation

« 32 » While the traditional Western theatre artist would not be likely to conceive of or articulate her work in these terms, I suggest that it is this very process of Black Box "whitening" on both the level of individual characters and the social system that they participate in constituting that motivates the entire enterprise of naturalistic theatre vis-a-vis the "deeper meaning" that the director is charged with "inscribing in the time and space of the performance."

« 33 » The dominant Western model of play production that evolved (along with the emergence of the position of director itself) in the second half of the 19th century, and is still taught in many Master of Fine Arts Directing programs, including the one in which I teach, begins with an intensive "pre-production" period of textual analysis. Confronted with the behavioural descriptions that constitute the playwright's text, the director embarks on what is clearly a process of "cybernetic explanation" as articulated by Gregory Bateson, in that it is always "negative" and considers

" what alternative possibilities could conceivably have occurred and then ask[s] why many of the alternatives were not followed, so that the particular event was one of those few which could, in fact, occur." (Bateson 1987: 405)

« 34 » Various textbooks on the subject of play direction have laid out overlapping categorical templates for organizing the information contained in the play and that Stanislavski grouped under the heading "given circumstances." The composite picture that emerges from this analysis can also be classified under another term. Returning to Bateson, "the course of events is said to be subject to *restraints*, and it is assumed that, apart from such restraints, the pathways of change would be governed only by equality of probability" (Bateson 1987: 405f). Actors and directors are similarly charged with the task of close textual analysis, leaving no potential restraint unaccounted. It is these restraints, including the internal mechanisms of the characters, that will govern the process described by David Ball, in which the

S   Character's interpretation of given circumstances
     (What is [appears to be] the case)

S*   Objective
     (Desired State)

Δ   Discrepancy or comparison between S and S*

R   Tactics
     (What to do with Δ)

E   Body and voice
     (Effector)

C   Cognition
     (Comparator)

X   Playwright's given circumstance
     (State of affairs represented by S)

Figure 2 • Character as basic feedback control system.

beginning of a play presents a portrait of stasis (Claudius on the throne and Hamlet sulking silently), the stasis is disrupted by a moment of intrusion (the ghost of Hamlet's father commands his son to avenge his murder) and, by the play's end, a new stasis is established (Fortinbras on the throne and the stage littered with the corpses of Hamlet, Laertes, and Gertrude as well as the previously slain Polonius, Ophelia, Rosenkrantz and Guildenstern) (Ball 1983: 19–24). The example of Hamlet, while by no means naturalistic in the strict sense, does illustrate well a play's action as the self-reorganization of an autopoietic social system (a la Luhmann) following a substantial perturbation. The amount of ink spilled speculating upon the particular ways in which the internal mechanisms of that play's central Black Box (i.e., character) constrain the paths of that reorganization outstrip the amount spilled in the name of cybernetics by considerable orders of magnitude; and in the realm of theatre production, the structure of such mechanisms is the essential purview of the actor.
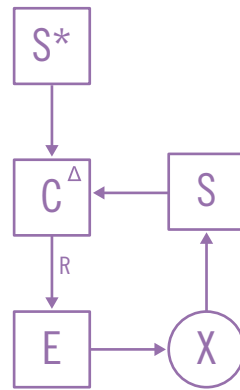
The naturalist actor as radical constructivist

« 35 » Figure 2 adapts Jim Rebitzer's diagram of a basic feedback control system to illustrate the cybernetic conception of the actor/character in performance (Rebitzer 1995: 47; the categories from Rebitzer's orig-

inal legend are included in parentheses). The existence of playwright's given circumstances and character's interpretation of given circumstances as separate categories points to the assumption of a distinct, subjective onto-epistemology for each character; the construction of which it is the actor's task to trace carefully.

« 36 » Of the many templates on offer to assist in this task, I regularly recommend to my acting students one developed by Anita Jesse as particularly thorough. It guides the actor to answer, from the character's perspective, questions about their particular social background, relationships, attitudes, desires, fears, etc. based upon textual evidence. The final, and most encompassing, category of given circumstances in Jesse's template is titled: "What is my point of view, or how does the world work?" It is characterized as follows:

" The *point of view* is the character's belief system, the frame of reference in which the character operates. Each of the convictions that make up the belief system should be anchored in specific action. For every element of a person's belief system there is an event that either inspired the belief or at least corroborates the point of view. People don't consciously choose to *invent* convictions; they interpret their experiences as proof that 'this is how the world works.'" (Jesse 1996: 136. Italics in the original)

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Figure 3 • Skeleton of conversation A (after Scott 2011).

Director and actors in "strict conversation"

« 38 » The director will, of course, also have completed a similar process of investigation of the given circumstances. Table 1 adapts the template of renowned British director Katie Mitchell (2009:10), incorporating second-order cybernetic terminology drawing from Maturana and Varela and referring back to the previous figure of the character as feedback control system.

« 39 » Conversation A, in which the director and actors share the fruits of their analyses, refine and expand their findings, and, ultimately, formulate scene objectives to test through improvisation, qualifies as what Bernard Scott would call a "strict conversation." Figure 3 adapts Scott's "skeleton of a conversation" from its initial description of a teacher/student interaction through the lens of CT (Scott 2011: 310) to the particularities of the director/actor relationship. In the context of Pask's CASTE educational application, the modelling facility is the space (either literal or virtual) in which projects testing the student's level of mastery of the topic are completed. For our purposes, the modelling facility is the stage, as this is where the collaborative formulation of given circumstances and objectives will be tested for their efficacy in actor improvisation, observations of which will re-enter subsequent iterations of Conversation A. But before making that move, I propose our first application of CT in order to leave, in the words of its creator, a "residue" of the conversation that can be employed for analytical purposes after the fact.

« 40 » As a depiction of an uninterrupted encounter between two characters, *Salt-Water Moon* provides an ideal play upon which to experiment with the graphical expression of conversation as "concept shar-

« 37 » In Piagetian/Glasersfeldian constructivist terms, this "point of view" contains, or is the summation of, the entire repertoire of conceptual and behavioural schemes that have proven viable over the course of the character's imagined ontogeny and have subsequently been internalized according to the innately conservative phylogenetic tendency, articulated by Maturana, of repeating what has worked in the past as the surest means of maintaining equilibration and, ultimately, the continued realization of autopoiesis (Glasersfeld 1980: 77f). In fact, the very climax of a good percentage of naturalist plays is the moment when the central character either succeeds or fails at making a necessary accommodation of the sort von Glasersfeld defines[5] (Ibsen 2015). It is, therefore, incumbent upon the actor to scour the playwright's description for reports of those formative ontogenetic episodes in the character's "back-story" (again, understood as having taken place in the hypothesised "possible world" of the play) as well as the assimilatory and accommodating schemes employed and on display in the present action. Jesse lays strong emphasis upon the need for the actor to "internalize" rather than "show" this conceptual repertoire; to get "behind the eyeballs of the character" as Cohen puts it, so that it will guide spontaneous behaviour through the recursive iterations of improvisation leading to performance.

5| E.g., Hedda Gabler's fatal inability to conceive of Eilert Lovborg as anything other than a kind of Dionysian übermensch "with vine leaves in his hair" and to accommodate successfully his sordid end: accidentally shot through the bowels in a tawdry whorehouse.

Place	The environment the characters are in	structural coupling
Character Biographies	The events in the past that shape the characters	ontogeny
Events	The changes that affect the behaviour of the characters	perturbations
Intentions	The pictures of the future that drive the present action of the characters	S*
Relationships	The thoughts about others that calibrate the behaviour of the characters	S

Table 1 • Katie Mitchell's given circumstances in second-order cybernetic perspective.

ing" envisioned through CT. The analytical process executed by actors and director described above deals quite specifically with the identification of stable concepts within the participants (characters). Figure 4 adapts some of Pask's techniques for the construction of entailment structures in order to diagram a conversation between two participants, the result of which, if agreement is reached, some, or all, of the conceptual procedures belonging to each may now be shared by both (Pask 1980a). This adaptation reflects the concept-sharing executed in the following passage of text from the play, regarding the character Mary's late father who was killed at the battle of Beaumont-Hamel in the First World War.

❝ Jacob: Go on with you. Jim Snow was a brave man. The one the stretcher bearers found closest to the German wire that night when they went out to collect the dead.
Mary: Yes, and a lot of good it done, his courage. He left behind two daughters and a wife who can't look after us. ❞ (French 1988: 40)

« 41 » The entailment structure in Figure 4 establishes a schematic overview of the contesting ontologies at play in this interaction in which the concepts "brave" and "courage" are assumed to be analogous (this could, of course, be contested) while the differing entailed descriptions produce an ambiguous and jarring counterpoint. Interestingly, neither character contests the other's description allowing them fully to resonate in tension within the conceptual repertoire of the audience who, like the characters themselves, are free to take on or reject parts or all of both descriptions or combine them in novel ways. This basic entailment structure can, of course, be elaborated to express the conceptual relations between all of the topics of conversation between the two characters throughout the course of the play. That one entailment represents the conceptual operations of a hypothesized independent young man in the summer of 1926 and the other a hypothesized dependent young female housekeeper of the same time period seems ripe for the kind of social constructivist analysis intended to trouble and problematize the naturalization of such concepts and the unremarked erasure of the contingency of their production. This is

what makes the composition of such entailment meshes during Conversation A a critical component of the cybersemiotic investigation I am proposing to take place after the passions of performance have cooled.

The stage as modeling facility

« 42 » Robert Cohen's notion that "humans are skilled observers and interpreters" of "autonomic responses" of the "physiology" of other humans commits theatre practitioners working in the Stanislavskian tradition to a biosemiotic epistemology characterized in Brier's cybersemiotic framework as "the genuine semiotic level belonging to all living systems." The "paralinguistic […] sign games" of this level function below that of "social language systems" and serve as the scaffolding upon which they are built (Brier 2008: 390).

❝ It is obvious that what we call language games arise in social contexts in which we use our minds to coordinate our wilful actions and urges with fellow members of our society. Some of these language games concern our conceptions of nature as filtered through our common culture and language. But underneath that, we also have emotional and instinctual *psychological sign games.* For humans these function as unconscious paralinguistic signs, such as facial expressions, hand gestures, and body positions that originate in the evolution of species-specific signification processes in living systems. ❞ (Brier 2008: 395)

« 43 » I posit that it is the spontaneous, non-premeditated emergence of these sign games amongst actors engaged with each other cybernetically, and their subsequent "emotional and instinctual" recognition by observers, that constitute the very phenomena categorized by acting students (and, arguably, the majority of mainstream theatre audiences) as "truthful" or "natural" and gestured to by the theatrical cognitivists as phenomenologically unmediated embodied forms of knowing.

« 44 » In his critique of the Stanislavski system of acting, postmodern performance theorist Phillip Auslander rejects the notion that "the actor's self precedes and grounds her performance and that it is the presence
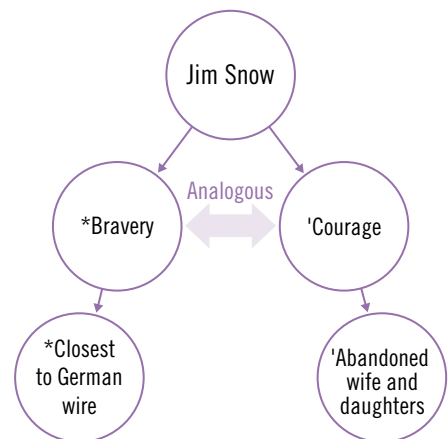

Figure 4 • Entailment structure showing Jacob and Mary's operationalized concepts regarding the topic, Jim Snow.
* = Jacob's concepts, ' = Mary's concepts.

of this self in performance that provides the audience with access to human truths." He asserts, instead, that "[t]he act of signification produces its own significance" and that there is "no presence behind the sign lending it authority" (Auslander 1998: 30). From the cybersemiotic perspective, however, the "presence behind the sign" is the actor's very embodiment itself. Its fluctuating autonomic and unconscious behaviors, while unconcerned with consciously signifying anything, engaged cybernetically within imaginary circumstances, enter the realm of semiosis only when indicated as distinctions by conspecific observers sharing a mutual structural coupling. Nowhere in this process, for either actor or audience, do we find the "reification" of a "non-existent autobiographical self" as alleged by Auslander and other theatre scholars of a similarly postmodern bent. It is also noticeably absent from any of the instructions Stanislavski bequeathed to his followers.[6]

6| Stanislavski's error, according to Auslander, is that he "treats the subconscious as what Derrida shows it is not; a repository of retrievable data, as in his famous metaphor of the house through which the actor searches for the tiny bead of an emotion memory." Citing Derrida's reading of Freud, Auslander reminds us that "the making conscious of unconscious materials

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« 45 » Appealing to interdisciplinary arguments "for the importance of embodiment in semiosis," Brier goes on to invoke a second-order cybernetic concept that will play a central role in the theory of theatrical "meaning making" presented below.

❝Ethology and embodied metaphor theory have both discovered that the conception of a sign as standing for something for somebody in a particular way is controlled by releasing mechanisms that connect motivation, perception, and behaviour/action in one systemic process, as von Uexküll described in his *Funktionskreis* and which Heinz von Foerster refers to as perceptual *Eigenvalues*.❞ (Brier 2008: 393, italics in the original)

« 46 » Hypothesized given circumstances, objectives, tasks, and obstacles from Conversation A "pass the test" in the modelling facility if their operationalization within the improvisation generates behavioural eigenvalues across the group of observers present (including the actors second-order observations of their experience after the fact) that are isomorphic with eigenvalues observed in off-stage daily living, seem appropriate to the behavioural descriptions

is a process of creation, not retrieval" and that "[t]he unconscious is not a source of originary truth – like language, it is subject to the vagaries of mediation" (Auslander 1998: 26). While Stanislavski does, indeed, invoke the metaphor quoted above, Auslander completely distorts the spirit in which it is offered. Stanislavski fully acknowledges that a memory is not an exact replica of the event to which it refers and tells us that there is an unconscious and automatic selectivity involved over time lending "poetry to memory" and rendering it "clearer, deeper, denser, richer in content and sharper than reality itself" (ibid: 206). More importantly, he actively *discourages* his students from relying upon the deliberate, repeated reconstruction of autobiographical memories as the foundation for "truthful" performance (ibid: 207). He warns them not to "imagine for a moment" that they "can retrieve a feeling that has gone forever" and admonishes them to "give up the idea of hunting old beads – they are beyond recall" (ibid: 216). Instead, Stanislavski exhorts his charges to allow ever new and evolving emotional overlaps with their characters to arise, as much as possible, in spontaneous response to the actual sensory "stimuli" available to them in the moment of performance itself.

in the text, and in which the director feels reasonably confident that, in subsequent performative iterations, they will generate similar eigenvalues across new groups of observers; namely audiences. At that stage, it is probably most appropriate to describe them, after von Foerster's article introducing the concept, as eigenbehaviours (Foerster 2003a). These emerge, in the words of Bruce Clarke, when "a multiplicity of mutually reinforcing observers maintains relationships and states of stable cross-systemic resonance […] at both the biological and social level" (Clarke 2009: 46). While the director's (and, subsequently, audience's) observations, interpretations, and assessments of the plausibility of the character's behaviour will be influenced by the "theory of mind" that they have developed for each of the individuals under observation, such behaviour could also be illustrated on a purely symbolic semiotic level by highly calculated performances of obvious "theatricality" bearing little or none of the "spark of genuine life" sought by Stanislavski and his artistic heirs. The "emotional and instinctual psychological sign games" enumerated by Brier, plus the haptic effects of organic, spontaneous vocal tonality and dynamics borne of felt, rather than feigned, emotion, all held to be pre-linguistic, pre-conceptual, and pre-symbolic by the proponents of the cognitive turn, are the exclusive domain of the biological eigenbehaviour.

« 47 » At this stage in the rehearsal process, it is essential that the director's relationship to the emergent behaviour remain an "open" rather than "closed" loop in that she does not seek to intervene and correct the behaviour if it is discordant with either her theory of mind regarding the characters or on the level of eigenbehaviours isomorphic with observed daily life. For Stanislavski, it is essential to remain a "director of the root" rather than a "director of the result" (Cole & Chinoy 1976: 109). In other words, she must not interrupt the unfolding improvisation nor even, following the performance, ask the actors for specific behavioural alternatives in the next iteration ("faster/slower, louder/softer, more angry, more seductive, with a pause here, etc."). She must not even compare the actors' emergent behaviour with some desired ur-performance she has imagined but rather must obey the imperative of

director, Ann Bogart, to watch "without desire" (Bogart & Landau 2004: 31) and allow only the "plausibility" and "believability" of the scene, regardless of its actual dynamics, to guide her response.[7] Even then, she must not express those responses in terms of "right" or wrong" but seek only to address those moments and passages that seem unsatisfactory by reverse-engineering alternative behaviour through further mining the onto-epistemic mechanisms of the characters and the constraints manifest in their relationships and environment to which they must constantly adjust. This will be the business of Conversation B.

Conversation B and the return to the text

« 48 » The only important point that needs to be raised here regarding the move through Conversation B and the beginning of the next recursion with the return to the text is the importance of maintaining the strict separation between the two steps. Conversation B is entirely concerned with distinctions and descriptions of what took place during the previous improvisation. The subsequent return to the text provides the opportunity to refine or indicate further distinctions within the playwright's descriptions of the interaction system with which the improvisation is intended to be, in ever increasing degrees through the process of recursion, isomorphic. These distinctions will now meet the re-entry of the distinctions drawn in Conversation B in the subsequent iteration of Conversation A. It is here

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7 | I learned this lesson the hard way a number of years ago directing a company of actors of wildly varying levels of experience. When I finally got so frustrated trying to get them to do what I wanted in a repeatable fashion that I completely gave up, I was suddenly free to see what they were *actually* doing, free from an ongoing comparison with how I thought their rhythms and dynamics should sound and where I believed all the pauses and transitions should be, which, to my delighted, and humbling surprise, more than adequately satisfied the two essential criteria specified above. Critics particularly praised the production for its acting and I have never been the same director since.

that non-isomorphic irregularities will be identified and adjustments in the onto-epistemologies at work through the characters in the action of the play will be proposed as a means of generating new eigenbehaviours. Beyond the first iteration of Conversation A, the onto-epistemologies in question may not only be those of the characters but of the actors as well.

Conversation A: Subsequent iterations with re-entry

« 49 » Confronted with those moments when "the given material fails to stimulate you sufficiently and you must search for something which will trigger an emotional experience… and send you into the immediate action of the play," Stanislavskian actor/director/teacher Uta Hagen extends the range of inputs available to the actor through her development of the substitution technique.

❝A young actress working on the part of Manuela in *Children in Uniform* was having difficulty with the moment when Fraulein von Bernburg, the teacher she loves and admires confronts her with her torn chemise and says, 'This will never do!' Manuela must react with deep shame and humiliation. The actress could not make this moment meaningful. Neither the garment nor the actress playing the teacher seemed to matter enough to her. Accidentally, I supplied her with a stimulating substitution for both teacher and chemise. I said, 'What if Lynne Fontanne had a pair of your soiled panties in her hand and showed them to you?' The actress turned beet red, snatched the chemise from her Fraulein von Bernburg and hid it frantically behind her back.❞ (Hagen & Frankell 1973: 35)

« 50 » Substitution has become a widely known and practiced technique over the last half century plus and the exchange described above is exactly the sort of thing that might take place when the results of an improvisation are being compared with the playwright's descriptions in an iteration of Conversation A with re-entry. It is also a technique to which CT can be applied through the expression of an entailed analogy as presented in Figure 5, again adapted from Scott (2011: 319). The composition of

Universe I: Manuela's behaviour
A Manuela's shame
B Fraulein von Bernburg
C Torn chemise

Universe II: Actress's behaviour
P Actress' shame
Q Lynne Fontanne
R Soiled panties

Figure 5 • Substitution as analogical entailment (after Scott 2011).

such entailment structures at this point in the AA process would provide us with yet another object of second-order cybernetic study with particularly rich possibilities for analysis.

« 51 » At work in the example above is a complex constellation of social signification through the dual lenses of both the character's and actor's conceptual operations regarding such topics as hierarchical social status and the female body and its traces (to name only two of a great possible number), which, when executed simultaneously, give rise to the biological eigenbehaviours of blushing, snatching, and hiding likely to be "read" cybersemiotically by audiences as signs of shame; biological eigenbehaviours triggered by elements of the character/actor's "semiosphere" that are quite likely to have been deeply influenced by the impingement of societal concepts around normativity, deviance, reward, and sanction in their cognitive formation. Much detailed analysis of the complex interplay between biologically and socially constructed semiosis employing the full arsenal of critical theory could potentially be facilitated through a combination of audience questionnaire data, audience clicker data, and the conver-

sational "residue" of entailment structures illustrating the conceptual operations at work across the range of nested Black Boxes that are the observer/participants in the production and reception of these eigenbehaviours in performance.

Performance

Inside every theatre there are *n* Black Boxes trying to get out

« 52 » Figure 6 applies Glanville's diagram of recursive Black Boxes to the naturalistic theatrical cybersemiotic laboratory I am proposing. To the audience, the interaction system depicted in performance is a Black Box that, as Glanville indicates, is made white within as the Black Boxes nested inside it (the characters) make descriptions of each other (Glanville 1982). These descriptions guide the emergent dynamics of cybernetic interaction between them. Continuing to follow Glanville's recursive logic, audience members plus performance now constitute new Black Boxes that are whitened within as individual members draw their own distinctions regarding the behaviour under observation and describe
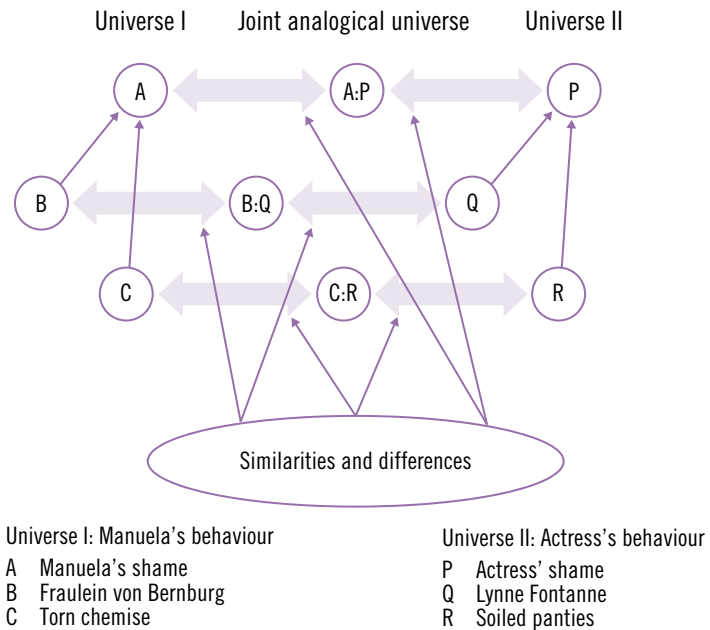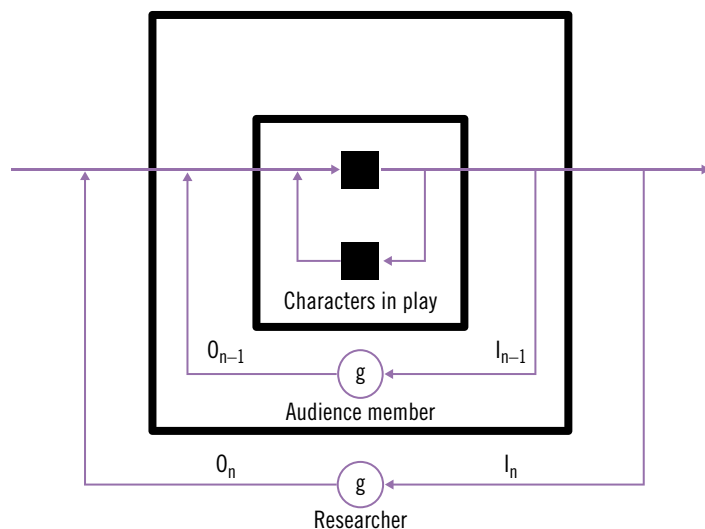
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Figure 6 • Cybersemiotic theatrical laboratory as nested black boxes. O: output, I: Input, g: stable observations across recursions (eigenbehaviours).

its mechanisms to themselves through the act of semantic and semiotic interpretation. These acts of distinction and interpretation can be considered second-order operations performed upon emergent eigenbehaviours (both biologically and socially/symbolically constructed) and carry the requisite awareness of contingency (to greater and lesser degrees across the various audience members) to qualify as observations of a genuinely second-order (Luhmann 2000: 54–101). The final Black Box (and subsequent whitening) we encounter in this discussion is that of the researcher (myself) seeking to describe the mechanisms of interpretation at work amongst the audience as individuals, in total, or on average by performing second-order operations of distinction and interpretation on the data collected through the questionnaires and clickers. If, over its recursive iterations, the nested systems described above stabilize on particular descriptions that hold across their boundaries, they assume the status of eigenbehaviours for which it is possible, as Glanville says,

66to have an apparently fixed, shared, social value, or to be what are thought of as 'facts' The black box model does not, thus, preclude e.g., science.99 (Glanville 1982: 6)

It is critical, however, that we do not fall into an error similar to that committed by the

hard core of the cognitive turn and mistake the word "science" for "objective ontological truth" rather than continuing to view it as a powerful and useful description that continues to work only until it does not and is always circumscribed by the closed operations and bounded rationality of the observer/participants.

Performance texts: autopoietic vs. allopoietic

« 53 » While celebrating the epistemological latitude provided by the Black Box, Glanville reminds us how essential it is that we never relinquish our constructivist perspective on its use.

66It is important to note the essential contribution of the observer in all this: (s)he brings in the Black Box, operates it, observes, and creates the pattern that is taken to be symptomatic of the mechanism within.99 (Glanville 2012: 421)

« 54 » Once a play enters the production process, the most empowered observer is, traditionally, the director. It is easy to see how, without keeping Glanville's admonition alive, she can be easily seduced by the belief in one's own powers of "objective" analysis so prevalent in first-order science (and first-order cybernetics for that matter). This is not surprising given that virtually every canonical text employed in the teaching of play direct-

ing (explicitly naturalistic or otherwise) reinforces the notion that the director's primary function is to use all of the theatrical resources at her disposal to make tangibly visible her interpretation of the play's "deeper meaning" (see e.g., Dean & Carra 1989; Hodge 1994; Sievers, Stiver & Kahan 1974) or, in our terms, her own particular whitened version of the Black Box. This positions the director as a kind of "privileged observer" who will, as Niklas Luhmann describes "observe his emerging work in anticipation of its observation by others" and, despite the fact that

66there is no way of knowing how others […] will receive the work through their consciousness […] he will incorporate into the work ways of directing the expectation of others.99 (Luhmann 2000: 40)

At work here, perhaps tacitly, is precisely the kind of "ontological thinking" described by Krzystof Matuszek:

66Ontological thinking presupposes the existence of a privileged observer endowed with authority, who describes and explains reality in the only correct and binding (for everyone) way […] The privileged observer instructs those who stray, corrects their mistakes and guarantees the final convergence of all observations.99 (Matuszek 2015: 204)

« 55 » While the likelihood of completely achieving such a feat might be slim, this description vividly captures an ideal of the theatrical director that many postmodernists within the field of theatre studies suspect, with good reason, to be the, more or less, unconscious *modus operandi* of traditional theatre practitioners and, particularly in the case of realism/naturalism, view with the deep suspicion illustrated in the opening section of this article.[8] On the second-order cybernetic front, such a procedure can also been seen to "violate" both Heinz von Foerster's ethical imperative to "always act so as to increase the number of choices" as well as Larry Richards anticommunication impera-

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8| Moreover, the more-or-less continuous "closed loop" control exerted by the director working in this manner quickly begins to sap the genuine responsiveness and creativity of the actors; not to mention their very enthusiasm for the project itself.

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tive stating that, if we "desire the new" we should "compose asynchronicity" (Richards 2010: 13f). A desire to confront these issues and assumptions played a crucial motivating factor in the experiment described above and inspired me to specifically investigate the impacts of both autopoietic and allopoietic performance texts in the first place; an investigation that I intend to continue with the even sharper second-order cybernetic focus provided by the application of CT.

« 56 » When watching an autopoietic performance the audience observes an interaction system for which, as Richards puts it, the initial description manifest in the formal language of the script (dialogue and stage directions) provides a "skeleton of constraints to guide action" that can then "*trigger* a dynamics of interaction that can lead to new distinctions" (Richards 2010: 15). The potential development of a cybernetically grounded naturalistic theatre less hermeneutically coercive than is traditionally the case is one of the research strands to be pursued as this work continues.

Future directions

« 57 » In reference to an fMRI study performed on improvising jazz and rap musicians at Johns Hopkins, Clayton Drinko comments that "[t]he outward focus that improvisation demands allows the intuitive and creative brain centers to flourish, while drastically inhibiting self-censoring regions." While it may be difficult to interpret such scans with explanatory exactitude, at the very least "it appears that the brain

is operating quite differently while improvising than while performing memorized scores" (Drinko 2013: 96). And, while the promise of the "mirror neuron" theory (an eagerly embraced and essential cornerstone of the cognitive turn) has increasingly come under fire (see, e.g., Hickok 2014), it may still indicate some degree of "contagion" of mental states capable of creating a palpable sense of difference in an audience if, as Merlin promises "the sense of improvisation is carried all the way from first preview to last night" (see §17) of a play rehearsed through the cybernetic practice of AA.

« 58 » Hans-Ulrich Gumbrecht suggests that we challenge the primacy of the hermeneutic imperative at the heart of "Western" culture and, instead, "conceive of aesthetic experience as an oscillation (and sometimes as an interference) between 'presence effects' and 'meaning effects" (Gumbrecht 2004: 2). In an essay taking up Gumbrecht as well as George Spencer-Brown and Niklas Luhmann, Edgar Landgraf outlines a psychic mechanism within the observer of an improvised performance that might engender a sense of "identification" powerful enough to account for such interference.

" Identification here would mean that temporarily one would no longer observe the action from a distance – that is, draw one's own distinctions to observe the event – but instead would 'embody' the process. That is, to experience a performance as such, one has to experience the logic of the distinctions drawn and the operations performed as one's own. The point is that such an identification with the performance is not symbolically mediated, as Adorno would have it, but rather results

from a (nevertheless cognitive) identification with the self-programming of the form-creating process." (Landgraf 2009: 194)

« 59 » Gumbrecht and Landgraf's theories identify one thread of the complex interplay between biologically and socially structured semiosis that I intend to follow as I continue this work. At the same time, I intend to investigate Bertolt Brecht's claims that the kind of identification described above, and in which Stanislavski's theatre most deliberately traffics, militates directly against the awakening of social consciousness and subsequent activism and calls for a vehemently anti-naturalistic theatre capable of encouraging a genuine second-order awareness of the contingency of dominant societal structures.

Conclusion

« 60 » In this article I have posited that an analysis of naturalistic theatre's processes of meaning-making filtered through the constructivist ontological agnosticism of second-order cybernetics offers a productive middle way forward for those on both sides of the social constructivist/embodied cognitive realist divide, within and beyond theatre studies. Once employed, we need not be paralyzed by Knowles admonition that "we risk policing the 'appropriate,' 'normal,' or valued characteristics of elements of the world and of humanity each time we say of a representation, 'yes, I recognize that'" (Knowles 2014: 4) or that giving some credence to our embodied responses to

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naturalist performance dooms us to being "what the French Marxist philosopher Louis Althusser calls 'hailed,' or 'interpellated' into an ideological system" (ibid: 33) that we are not still free to deconstruct employing Marxist, feminist, queer, or critical race theory to name only a few of the discourses which would remain fully at our disposal.

« 61 » If we can re-conceptualize naturalist theatre (and perhaps all representational art) as dealing in the generation of eigenbehaviors rather than laying claim to objective portraits of "reality" and examine those eigenbehaviors through a cybersemi-otic lens employing both quantitative data around meaning and believability and conversation theory reflecting the operationalized conceptual schemas of characters, actors, and, ultimately, audiences (through either pre- or post-show group facilitation or software assisted compilation), and that, with regard to their emergence, denies neither the influence of culturally constructed language games nor bioconstructive couplings between embodied cognitive agents and certain invariant (but only indirectly accessible) aspects of their environment, we can commence to tease out the complex interplay between "biological and social level" eigenbehaviors in a manner free of the fundamentalist excesses of both totalizing cognitive-scientific objectivism and paralyzing postmodern scepticism providing great potential benefit to scholars and practitioners on both sides of such theoretical divides. The theoretical formulation and experimental procedure described in this article were undertaken as a hopeful first step in this direction.

Open Peer Commentaries
on Tom Scholte's "Black Box Theatre"

Audience and Autopoiesis

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> **Upshot** · Scholte's approach to theater as a black box to be probed indicates that the vocabulary of second-order cybernetics provides an analytical repertoire adequate to the complexity of theatrical phenomena, from the construction of the play in rehearsal to the delivery of the play in performance. While it was hard to discern the precise details in some of Scholte's experimental protocols, we found his larger discussion to be provocative and effective in mapping the recursivities of theatrical processes.

« 1 » Tom Scholte introduces his directorial experiment as part of a research agenda concerned with "the ways in which […]the Stanislavski system of acting can consistently generate 'believable' performances […] but also […] questions regarding the mechanisms through which observers (audiences) assign this sense of 'belief' as well as 'meaning' to these performances" (§2). To open, or "whiten," the Black Box of such theatrical phenomena, Scholte adapts Ranulph Glanville's elaboration of Norbert Wiener's evocation of James Clerk Maxwell's invention of the idea of the black box to denote any system for which we can make external observations of its behavior – for instance, that inputs of one sort produce outputs of another sort – while lacking knowledge regarding the internal processes by which these behaviors are produced. In Glanville's summary, Maxwell posited the notion of the black box…

❝in order that he could justify the building of functioning descriptions (i.e., in his case, equations) that accounted for the observed behavior of some phenomenon when the workings of that phenomenon were not clearly visible.❞ (Glanville 1982: 1)

Glanville noted that Maxwell was previously the author of a fictive "demon," and we would add that along with the invention of the Demon as a kind of "supernatural" observer, Maxwell's thought experiment also placed his Demon within a box-like apparatus, a sort of proto-black box for the Demon to inhabit and within which to work its white scientific magic.

« 2 » Maxwell conceived his famous Demon, you will recall, in order to "pick a hole" in the second law of thermodynamics. The drift of closed physical systems toward increasing entropy due to the leveling of energy differentials could be counteracted, Maxwell surmised, if only one could insert into that system an agency capable of discriminating high- from low-energy particles and sorting them into separate containers. Thus the Demon's box was partitioned into two chambers. The Demon would do its sorting among randomly hot and cool molecules using an aperture in the partition to gather hot molecules into one chamber and cool molecules into the other. The Demon would thus defy the second law by lowering the entropy of the system, restoring a heat differential from which work could be extracted, not by the application of additional energy, but simply by the ordering effect of its ability to operate upon an internal observation of the system contained in the box as a whole (Clarke 2001: 103–110).

« 3 » Maxwell's Demon comes down to the history of cybernetics not only as the genius presiding over the transformation of the quantity of entropy in Boltzmann's statistical mechanics into the quantity of information in Claude Shannon's information theory, but also as a precursor to the second-order cybernetic prescription to position the observer *within* the system to be observed. One may pick up this thread in Heinz von Foerster's 1960 essay "On Self-Organizing Systems and Their Environments," where von Foerster puts not one but two Maxwell's Demons to work observing the ordering and disordering processes constituted by adding environmental considerations to the observation of self-organizing systems (Clarke 2009). In this regard, Scholte describes a directorial experiment in which…

❝audiences were invited to view four performances of the entire piece in which the actors adhered to the author's written text while the performance text was still allowed to unfold autopoietically each night based solely on the actors' emergent and self-organizing cybernetic response.❞ (§20)

« 4 » Scholte's second-order cybernetic analysis of theatrical matters through the lenses of Gordon Pask's conversation theory and Niklas Luhmann's autopoietic theory draws upon a conceptual account well-funded by its inheritance of this line of systems discourse. With Scholte's guidance, one also recovers the theatrical and performative elements latent in systems theory's long history of constructing models in order to explore systems too complex to seize in their totality, but experimentally reducible to key parameters whose dynamics can be fruitfully observed. Every theatrical representation "constructs *a* reality" which is then rendered to reconstruction by multiple observers. Scholte's essay is illuminating, particularly in walking its reader through the recursive observational dynamics constituted by both the construction of the play through the rehearsal process that transforms a script into a theatrical work and the performance of that work ultimately presented to the gaze and response of an audience. With regard to the constructive work of the rehearsal, Scholte borrows Pask's concept of the "modeling facility," which for his purposes "is the stage," the theatrical Black Box,

❝as this is where the collaborative formulation of given circumstances and objectives will be tested for their efficacy in actor improvisation, observations of which will re-enter subsequent iterations.❞ (§39)

« 5 » It is also the case that we hit some speed bumps along the way. Scholte's account of how the director got out of the way of the players for a while as they – well – *played* with and in the text gave way to an opportunity for experimenting with audience participation/feedback. Scholte's first audience(s?) saw four performances that arguably were still rehearsals, in that the director withheld formal interaction with the actors' autopoiesis. Later audiences were invited to four performances of the director's "fixed […] allopoietic performance text" (§20). If we understand correctly, four of the performances featured actors treating the full text via what felt right and responsible to them, while four other performances featured the same text then sculpted by the director's blocking (creation of set movements, timing, and stage pictures). We would like to know more about how these audiences were constituted. For the autopoietic performances, "audiences were invited"; for the allopoietic ones, there were "invited audiences" (§20). It's unclear to us whether "invite" is being used the same way in these two instances. Were random people welcome to show up, or was the presence of particular people solicited?

« 6 » George Pierce Baker's early experiments with audiences as respondents for the work of his fledgling playwrights at Harvard in the 1910s had membership requirements and stipulated that people could be dropped from the roster if they missed too many performances (Chansky 2004: 97–106). Did the two sets of four audiences comprise the same people? The statement "Audiences were invited to view four performances" at first glance said to us that they had to commit to four viewings – something that could reveal much about the differing choices actors might make while still in that allopoietic phase. For instance, "by the third time around, I wasn't clicking as long or as hard," or, arguably more interestingly, "my heart raced when she turned upstage on that line – *so* unexpected after what she'd done the first three times." Minus such a control mecha-

nism, are we to assume that this experiment takes all audiences to be interchangeable? We are mindful here, too, of Joseph Henrich, Steven J. Heine and Ara Norenzayan (2010) calling most research studies that use North American undergraduates as respondents flawed if they are meant to talk about humans, either as cognitive or as sociosemiotic beings. These authors used the acronym WEIRD as shorthand for the usual Western, Educated, Industrialized, Rich, and Democratic suspects.

« 7 » Who then, exactly, was in Scholte's audience? Does the experiment assume that audiences are self-selecting members of the imagined community that more or less "gets" realistic theatre? If they are not – if they come from other cultures, or know little about theatre, or do not like theatre, will this experimental protocol fall apart? Does the requirement for them to be "conspecific observers sharing a mutual structural coupling" (§44) load the deck to excess? One hoary platitude has it that ninety percent of effective directing is casting. Should the director also get to cast the audience? Or, from another perspective, should a director be required to take seriously a response – via clicker, questionnaire, or what used to be called voting with one's feet – from a cohort ill-equipped to grasp his or her allopoiesis? (This may be irrelevant in the case of realism, but it is a definite theatrical impasse in work in other aesthetic modes.)

« 8 » Be that as it may, for the performance studies scholar also at home in the praxis that Scholte investigates, the mainstream, text-driven theatre practice built around mimetically constructed characters, he does nail the description of a conundrum, even as his answer to the problem may suggest little to directors and actors unschooled in the language of second-order cybernetics. To wit, he pinpoints an impasse within his field between the abstract linguistic-cultural idealism of the post-structuralists and the newer neo-Darwinist adaptationism of the "cognitivists." In rough terms, actors and directors who would embrace Scholte's suggestions might readily understand his "goal-directed and feedback-controlled" AA rehearsals (§10) as a generative period based on the crude idea that "acting is reacting" bundled with responsible textual analysis, a generous dose of improvisation, and the di-

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rector getting out of the way of the players for a while as they – well – *play* with and in the text. Further, we cannot imagine a practitioner who would not welcome the idea of "applied epistemology" (footnote 1) – the idea that we know via embodied doing – nor any who would refuse the idea of gently and generously taking care not to mistake "the word 'science' for 'objective ontological truth' rather than continuing to view it as a powerful and useful description that continues to work only until it does not" (§52). The concept of something "working" (unless it does not) is so common a shorthand in theatre that it might deserve a separate analysis of its own.

« 9 » By drawing out von Foerster's concept of eigenvalues (a topic explored at some length in Glanville 1982) as expounded in Søren Brier's discourse of cyber semiotics and, above all, in numerous variations by Louis Kauffman (1987, 2005, 2015), however, Scholte does demonstrate the potential of second-order cybernetics to deconstruct cognitivistic truth-claims regarding "phenomenologically unmediated embodied forms of knowing" (§43). In short, whereas the postmodern critique on the one hand lacks an account of systemic operationality and the cognitivist critique on the other hand lacks an account of recursive sociality, a robustly eclectic deployment of second-order cybernetics loops individual body-minds and their semiotic mediations into recursive social circuits in a manner that can account for their creative success if not predict the spontaneous content of their operations. Thus we find Scholte's approach to be an effective reminder of the breadth of second-order cybernetic conceptuality as it has developed since the 1970s and an apt demonstration that this vocabulary provides an analytical repertoire adequate in this instance to the complexity and manifold stages of the theatrical phenomena being described, from the construction in rehearsal to the delivery in performance of the play.

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"Truthful" Acting Emerges Through Forward Model Development

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> Upshot · My aim is to show that "truthful" acting that emerges through improvisation is equivalent to the development of mutual forward models in the actors. If these models match those of the audience members, this is perceived as "truthful."

« 1 » One of the aims of Tom Scholte's target article is to re-introduce the stigmatised word "truth" back into the discourse of theatrical practise and also constructivism. This has been (from my point of view) successfully achieved by using the rehearsal process as devised by Constantin Stanislavsky as a constructive example. Central to this approach is improvisation, where the actors base their actions on the internal goals of their characters and start to interact. If successful, the director, the audience and, thus, observers, as a result report the behaviour of the actors to be "truthful." The article bravely goes beyond the postmodernist notion that "truth" needs to be avoided at all costs and successfully removes its stigma.

« 2 » While the article succeeds in making "truth" credible again, it could have also benefited from being ambitious on the front of open vs. closed loop. This could have easily been taken into account as well because

from the cybernetic point of view, the target article is not just about closed loops but also about open loops. However, as with the word "truth," "open loop" is also often frowned upon in constructivism, which traditionally demands that descriptions are based on closed loops, recursions and the observation of loops by other loops. In this commentary I remind the audience of the concept of the *forward model*, which is a well-established construct in second-order cybernetics and control theory (Palm 2000). This concept is implicitly woven into the main text and my aim is to make it explicit in this commentary.

« 3 » First of all, we need to define "forward model." An ideal forward model is an open loop controller that no longer needs feedback to arrive at a desired outcome (Palm 2000). If we refer back to the well-trodden territory of the thermostat, then a thermostat action using a forward model will not require its feedback path because it knows the exact temperature change in advance when switching on/off the heating. It would notice a change from the desired state and then would switch on/off the heating without making any comparison of the achieved result with the desired result. Another example is a chef who knows exactly how much salt needs to be added to a soup without tasting it afterwards. The chef is able to achieve the perfect taste because he/she has operated in closed loop mode many times before but no longer needs to do it because he/she has a forward model.

« 4 » One might argue that we will not need forward models. It is of course possible to live without developing any forward models in our lives but this is a risky strategy. A purely reactive feedback system is always at the mercy of the environment, hoping that its requisite variety will always be sufficient when reacting against disturbances. The rabbit hopes to be fast enough all its life to escape all attackers. However, animals – and in particular humans – develop a multitude of forward models to pre-empt what is going to happen. This can only be achieved through learning, which step-by-step develops forward models through experience on top of feedback loops (Porr & Wörgötter 2002, 2005). Even if these forward models fail from time to time and the feedback loops need to kick in overall, the agent has developed mod-

els of its environment. This does not mean that the agent knows everything about its environment, but it has understood its own closed loops. With that knowledge, the agent knows how to avoid unexpected surprises. In the worst case, these might kill the agent. However, they could be just a situation where the agent enters a cocktail party with a room full of strangers. This leads us to the special case of human–human interaction, where two or more people try to develop forward models of each other.

« 5 » What happens if agents develop forward models of each other by interacting with each other? This is what Niklas Luhmann calls "double contingency" (Luhmann 1984). It is mastered by creating mutual forward models to achieve a high degree of certainty. For example, bakers often talk about recipes or theatre practitioners about the rehearsal process and not baking recipes. Here, learning develops forward models of the other person because the other person (alter) disturbs the closed loop processes of the first person (ego) and vice versa. It is important that both persons start off from their personal closed loops and that if they do not learn they just see each other as mutual disturbances (think again of the cocktail party with a room full of strangers). Only because they develop forward models do they actually create a closed loop system that spans through both of them (Porr & Di Prodi 2014). This is an important step and is often overseen because the people themselves become open loops (!) because they no longer need their own personal feedback loops. For example, when talking about the weather, the response of the other person is highly predictable. The person has developed a forward model of the other person in terms of the topic of weather. This can be termed as a theory of the other person's mind.

« 6 » Now we can go one step further and observe a conversation of two people, for example in a pub. It is important that the observer has developed her own forward models of conversations in the past as described above. The observer can observe and perhaps join into the conversation because of her forward models. This will work more or less seamlessly, depending on the topic and shared experiences, but it will be just part of the everyday operations in our environment.

« 7 » Now, observing acting is a special case in contrast to observing people interacting in everyday situations. The main text is spot on that the actors and the director need to find out what goals (or in control theory, desired states) the different characters want to achieve and that then, through the technique of improvisation, this will be tried, tested and evolved. Again, this can be understood in terms of forward models: at the start of the improvisation, the actors have a very limited or perhaps no forward model of the other actors' goals or closed loop behaviour. However, the two actors then learn to predict what the other actor is going to achieve so that their mutual uncertainty is reduced, in the sense of Luhmann's reduction of double contingency. If the improvisation has been successful (very similar to the everyday conversations), the actors will mainly act in open loop using their forward models by knowing what the other actor is trying to achieve. This is in stark contrast to reading out lines, which require very little predictive power and, thus, no forward model. An observer who watches the improvisation (or the director) should then be able to compare their forward models to that of the two or more actors on stage. If there is a reasonable match, then this is perceived as being "truthful" in the sense that there are similarities of forward models developed by both the actors and the audience.

« 8 » Scholte's article also has wider implications because improvisation imitates everyday double contingency reduction and acts as a convincing demonstrator/simulator of how everyday communication emerges. The actors face a similar challenge to somebody entering the aforementioned cocktail party with a room full of strangers. Again, here, forward models need to be developed to engage in meaningful conversations.

« 9 » As a final remark, I would like to draw attention to film, where certain directors use improvisation not just to shape the acting but as a tool for developing the story as such (as done by Mike Leigh for example). Another example is the recent film "Victoria," which indeed feels very "real." This has been achieved by just prescribing inner goals for the protagonists in the form of a treatment that they then use to improvise the action. Even in more traditional environments, film is usually developed as

a two-stage process where first, a treatment is written, which often describes the characters' goals, and then a script based on the treatment is evolved.

« 10 » Be it film or theatre, improvisation should be at the heart not only of the rehearsal process but ideally also of the story development itself.

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Naturalism in Improvisation and Embodiment

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> Upshot · This commentary adds historical perspective to the use of improvisation and conversation as models for the promotion of naturalism in acting. It wants to denaturalize naturalism and the concept of embodiment in support of Scholte's reconceptualization of the naturalist theatre, and concludes with a reflection on the societal function of art and theatre today.

The introduction of the chorus was the decisive step with which war was declared openly and honourably against any naturalism in art.
(Nietzsche 2008: 28)

« 1 » The "essentially cybernetic vision" (§14) Tom Scholte locates at the core of the Stanislavski system of acting (or Method acting) is most apparent in Constantin Stanislavski's use of improvisation. Improvisation demands a particular mindset, the attentiveness to one's surroundings and the willing-

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ness to stay "engaged in [feedback] loops within imaginary circumstances" (§16). Improvisation serves as a tool to evoke spontaneity and immediacy in acting, qualities that promote the semblance of naturalness and authenticity. These qualities are retained even after a scene has been memorized and has undergone "formalization" by the director.

« 2 » Stanislavski's use of improvisation resonates with one of the central theses of my book *Improvisation as Art: Conceptual Challenges, Historical Perspectives,* namely that "improvisation is best understood as a particular mode of *staging* art that shares properties common to various individual arts and fulfills many of the expectations we have for the arts in general" (Landgraf 2011: 11). My argument is based on the recognition that it is impossible to decouple improvisation fully from structure and repetition. Yet, despite following a deconstructive logic, I wanted to be able to account for the effects that are at the base of the continued association of improvisation with notions of spontaneity, immediacy, and inventiveness, effects recognized by practitioners as much as by their audience. Like Scholte, I drew on second-order cybernetics to circumvent the impasse between postmodern skepticism (expressed, for example, by Jacques Derrida's proclamation that improvisation is impossible) and the essentializing tendencies adopted by many practitioners of improvisation (e.g., Derek Bailey), who find the practice of improvisation in its "immediacy" utterly incompatible with theoretical reflection.

« 3 » Stanislavski's association of improvisation with naturalism most closely parallels the many comparisons of improvisation with conversation. In these comparisons, conversation is idealized as a form of free and spontaneous social interaction where the participants are thought to be able to act naturally and authentically. As in improvisation, this freedom is the result of long practice, of experience and situational familiarity, and is something that not everyone will learn to master equally well. A comparative analysis can further underline the social constructedness of "naturalism," even for conversation. Merely consider, for example, how aristocratic etiquette in pre-modern times encouraged quite different conversational practices than the bourgeois emphasis on sensibility that became dominant in

the course of the eighteenth century and put strong emphasis on non-verbal signs (blushing, feinting, gestures, etc.) in and outside the theatre. As I explored more extensively in my book, the expectation that interlocutors of a conversation engage in an open exchange of ideas ("stay engaged in feedback loops") is itself a modern development. Again, in feudal societies, by comparison, conversation was highly regulated and improvisation, too, did not aim for naturalism or inventiveness. The latter is apparent in the use of masks in the *Commedia dell'arte*, its repeatable plot structures, or the rhetorical corsets that defined and made predictable the practice of improvisation in older theatre and poetry traditions (see Angela Esterhammer 2008 and Beatrix Müller-Kampel 2003 for examples).

« 4 » This brief historical comparison should serve as a reminder of the constructedness of our contemporary views on the naturalness of conversation, improvisation, and acting. More specifically, I want to argue that the comparison between conversation and improvisation suggests that today the appearance of "naturalness" must itself be linked to the recognition of open and dynamic processes of social interaction. In cybernetic terms, nowadays actors and audiences alike have learned to read the emergent qualities of autopoietic performances as markers of authenticity and naturalism. This is why Scholte's turn to Gordon Pask's conversation theory for his quantitative analysis promises to be highly productive. Scholte might also want to include Keith Sawyer's work. Sawyer draws on Erving Goffman in his description of processes of "collaborative emergence" that he observes in improv theatre dialogues. The performances Sawyer analyses demonstrate how from contingent beginnings, an unforeseen story can emerge within seconds, a story with a defined plot, novel characters, specific times and places, and so on (Sawyer 2003: 41–43). In this regard, improv theatre can serve as a model for how to *stage* the absence of planning to create effects of spontaneity, immediacy, freedom, and authenticity.

« 5 » To look at conversations and dialogues as a model for autopoietic and self-steering processes is also to acknowledge that such processes develop not only around linguistic utterances, but consciously and

subconsciously involve many other elements, such as gestures, facial expressions, perception of place and time, timing, the surrounding atmosphere, etc. These are all factors that help determine what will be perceived, but also what an actor will experience and "embody" as natural and authentic behavior. Paskian cybernetics allows us to understand such experiences as mediated through our body's sensory apparatus. This means admitting pre-conscious and pre-symbolic modes of cognition and communication, while nevertheless maintaining that such experiences are acquired, are the product of cultural training (socialization and education), and reflect culturally determined expectations and interpretive patterns.

« 6 » The cultural dimension is often shortchanged by the humanities' recent turn to the cognitive sciences. In my essay "Form aand Event," I take to task the "naturalism" of theories of embodiment that employ the term "embodiment" as a foundational concept, as evidence for an evolutionary-physiological determination of our being-in-the-world. If we look at current debates surrounding the schools of thought associated with posthumanism, we notice on a much broader scale the renewed desire for ontological or physiological foundations, for a return to a realism that is not plagued by the specters of postmodernism. Cybernetics is not immune to this quest, even a cyber-semiotically versed thinker such as Søren Brier adopts embodiment as a central concept from where to develop a notion of reality that is thought to exist – and exist with definable qualities – independent of its (semiotic re)construction by an observer.

« 7 » Brier argues that "although we have rightly abandoned the notion of 'objective reality' in second-order cybernetics, we should not give up the notion of a partly independent 'outside reality'" (Brier 2008: 92). From the perspective of Niklas Luhmann's operational constructivism – which is more consequential, and asks us not to lose sight of the social involvement (communication) in our construction of knowledge – this "outside," too, has to be understood as the "inside" product of its observation, whereby the primary observer for Luhmann is not a subject, mind, or body, but the system of communication. The argument is simple. Anything we (individual minds) observe

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and any meaning we might attach to any observer, be it the mind, the body, a subject, or communication, will have to draw on the operations of the system of communication to do so. This applies also to our observations of reality. Accordingly, when Luhmann defines reality, for example, as resistance to arbitrariness, he still insists that reality remains the construct of system operations:

" When reality should still be understood as resistance against arbitrary thematization – and what other concept of reality would we still have – then we must be dealing with resistance of signs against signs, language against language, communication against communication. That is: we are dealing with recursively formed complexity. In its continuing operations, the system tests, so to speak, against self-produced uncertainty and self-produced resistance what, from moment to moment, it can treat as eigenvalue." (Luhmann 1997: 1126f, my translation).

« 8 » I will not be able to do justice to Brier's concept of cybersemiotics here, nevertheless, I want to suggest that Brier's "realism" fails to give due credit to the system of communication's role in defining the mind's ability to observe and attribute meaning to what it observes, including what it observes as physiological capabilities and needs that developed as the result of evolutionary processes. As Scholte notes, the point is not to ignore the realities science offers in its first-order observations, but to remind oneself that they, too, are observer-dependent and ultimately have to draw on and operate within the system of communication. Only by retaining an eye on both, observer and observed, can we overcome what Scholte describes as the "onto-epistemological deadlocks between constructivists and realists" (Scholte §3) and avoid the "fundamentalist excesses of both totalizing cognitive-scientific objectivism and paralyzing postmodern skepticism" (§61).

« 9 » More specifically, then, rather than naturalizing embodiment, drawing on Luhmann's systems theory, we can observe how the body is accessible by our nervous system (the sensory apparatus) that interacts (is structurally coupled) with the mind (consciousness understood as an emergent phenomenon) that in turn is conscious due to its structural coupling with the system of com-

munication, its ability to use language for the reproduction of its elements (perceptions, thoughts, feelings). Structural coupling is responsible for a high degree of stability in the interaction between these systems – what Scholte examines as eigenbehaviors – a stability that on the level of interaction between nervous system and psychic system is the result of long-term, evolutionary processes. We can think of consciousness or cognition or feelings as embodied in this sense and do not have to question the value of research that investigates the biological, physiological, chemical, semiotic, and other parameters that enable such a system to function and maintain relations to other systems and its environment. Such research will no doubt strengthen our understanding of the biological foundations of our mind, and of our sense of being-in-the-world. But one should not neglect what nothing demonstrates more clearly than acting itself: that the signification processes that are associated with embodied modes of cognition and experience, as well as their meaning, exist separate from these experiences, and can always be faked, simulated, feinted, and manipulated.

« 10 » How can we conceive the role of theatre and, more broadly, of art in the context of these observational practices? I quoted Nietzsche above, who sees naturalism as a principle enemy of the theatre. Nietzsche cites theatre's most famous character, Hamlet, in support of his thesis that art responds to the fundamental need for illusion (the need to "turn those thoughts of disgust at the horror or absurdity of existence into imaginary constructs which permit living to continue" – Nietzsche 2008: 29). Scholte reads the current return to naturalism as a reaction to a crisis of meaning, as representing a backlash against "paralyzing postmodern skepticism" (§61). It is certainly not surprising that a time that sees itself confronted with overwhelming natural and technological challenges and finds itself disillusioned about its political maneuverability, might put an increased stake into science and feel the need to emphasize the reality of the threat rather than concern itself with language games, rhetoric, performativity, or ideological contradictions (which appeared more meaningful in the aftermath of WWII).

« 11 » It is legitimate to ask what the role of art and theatre is under these circumstances.

Does art want to insist on expressing the reality of the looming social and environmental crises and their effects on contemporary society? Or does art remain committed to purely aesthetic criteria and thus aim to preserve its autonomy, or at least a certain distance from the immediate concerns of its time? From a systems theoretical point of view, there might be a middle ground. If we adopt the theory of modern society's functional differentiation, we will have to acknowledge that a social subsystem such as art is part of, but also limited in how it might affect society at large. Which raises the question of the specificity of art's mode of communication vis-à-vis that of other social subsystems. If we take "illusion" to be central to art and theatre, we can distinguish art in terms of it not being bound by what other social systems construct as their external reality. This freedom allows art to cite and recontextualize other societal discourses and thus make apparent the constructedness of the reality to which they appear to respond. Put differently, art in modern society "naturally" invites second-order observation on society's observations, instilling a sense of contingency and freedom, what Scholte, in a Brechtian spirit, calls a "genuine second-order awareness of the contingency of dominant societal structures" (§59).

« 12 » Whether naturalism in rehearsal and performance contributes or undermines this particular function of art, however, will again depend on the observer, on the audience, and on its ability to recognize naturalism in art as staged. Scholte's research project holds the promise to further our sensibilities in this regard, by examining more closely *how* naturalistic effects are produced, what signs, behaviors, gestures, and so on accompany communicational exchanges and create the impression of naturalism in today's culture – and thus invite second-order observation also of naturalism itself.

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Opening the Black Box of Minds: Theatre as a Laboratory of System Unknowns

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> Upshot • What von Foerster accomplished in raising the specter of second-order cybernetics now requires experimental design and the heavy lifting of theory to complete his quest for new ways of thinking. Scholte's "black box theatre" points to research into non-trivial systems as a formal means of grasping living systems.

« 1 » Heinz von Foerster loved magic, with its sleight of hand and how one's perceptual field is directed. Magic was of interest but his passion was how the sleight of mind in perception undermines the realist's claims to independent reality and objective tenets of science. In 1971 when I first met him in Cuernavaca, Mexico, where he was collaborating with Gordon Pask, Humberto Maturana and Douglas Engelbart over the future of the technologies arising from cybernetics, he was fascinated by the Eastern spiritual traditions of the koan. The koan is a question/riddle that cannot be solved by remaining in the same paradigm that framed the question. For von Foerster, second-order cybernetics was a koan requiring making the mind larger than the problem at hand and the facts given. Tom Scholte's answer to the koan of second-order cybernetics requires going to another level by moving upstream from the paradigm of science into the pre-conceptual, pre-perceptual world of art and theatre.

« 2 » Scholte's target article "Black Box Theatre" offers a refreshing alternative. With the example of theatre as an investigative tool in second-order cybernetics delving into the epistemological and ontological levels of systems, Scholte offers a research approach and agenda leading out of constructivism's "infinite linear circularity"[1] In-

stead of waging an assault on the paradigm of privileged observer knowledge and strong epistemological reductionism of science, Scholte opens the possibility of a research methodology based on the formation, conformation and deformation of the social life of information.

« 3 » What is radical in its very hypothesis is that beyond the level of command, control and objectivity, new research methods can test regulatory principles in the forming of information and the bounded contexts of communication. Meaning, identity, relationship, ecological insights could emerge in a carefully designed "system of systems" research effort. Von Foerster's central theme "How we know what we know?"

Pask in Cuernavaca, Mexico, which I attended. Pask was lecturing on conversation theory and doing one of his famous doodles of a double mirror picture of the human head, within a human head within a human head. Engelbart said that Pask's conversation theory reminded him of a fatal software programming mistake of infinite do-loops that went nowhere. "Infinite circularity" was a 1960s substitute term for continuous do-loops creating programming mistakes where there is no resolution except continuous processing. Engelbart added the term "linear" to infinite circularity because he wanted to emphasize the difference between vicious cycles, where learning occurred only within the bounded rationality of Pask's "teach-back," versus virtuous interactions, which address complexity by creating evolutionary intelligence. This was an epistemological clash between Engelbart, who championed the co-evolution of human mind and machine that seeks collective intelligence processes versus Pask's conversation theory, which emphasized learning to make knowledge explicit. Scholte relies on Pask's conversation insights but must emerge from Pask's inward spiral feeding upon existing "knowns" if a results-oriented research agenda is to be achieved. Engelbart's and, more recently, Francis Heylighen's work on bootstrapping processes of emergence of ever more complex adaptive systems (Heylighen 2013) is important in constructivist research. The productive link between Pask, Engelbart and Heylighen's work is their common pursuit of higher levels of relationships or meta-structures (scaffolding), which a reflexive theatre of theatre could investigate. Gregory Bateson's emphasis on co-evolutional structures of minds would assist researching higher levels of learning of systems of systems of second-order cybernetics.

(Segal 2001: 1) requires moving from worrying about truth to intelligence, from cognition to perception and from shattering the fantasy of an objective reality to deciphering the logic of interacting systems. The task is not to know what is *in* the black box but the structure of the box and its linkages, feedback loops and transformative processes of signs and symbols. Only by revealing systems of feedback loops, their consequences over time and the structural patterning of vicious versus virtuous cycles could von Foerster's deep concern for reigning in the "monsters of reason" (ibid: 2) set constructivism on a new course.

« 4 » Scholte boldly proposes that naturalist theatre "could provide a hitherto untapped laboratory for generation of quantitative and qualitative research pertaining to several dimensions of second-order cybernetics" (§3). His "hope is that the theoretical considerations discussed here might inspire others to bring their expertise to this fledgling research program" (ibid). Scholte points to a different way forward for epistemological constructivists by investigation of the perceptual interactions leading to the formation of the image or narrative through which the world emerges. Using the clash of meaning in the interactive theatre of observers and the observed, the regulatory functions within and between systems could be revealed and studied. Instead of focussing on constructivism itself, this direction of research is asking about the meta-rules and regulators of systems and their consequence in individuals, groups, cultures and beyond.

« 5 » What is the unique configuration and constitution of these perceptual lens and feedback loops? Organized systems of interactions of observers and observed are present in theatre. The arts operate at the pre-linguistic, pre-conceptual and pre-symbolic levels, where science appears excluded by its very act of operating on formed information and its reliance on the analytic droppings of data. Scholte makes the case that regulatory principles forming our fields of intelligence, perception could be probed. Probing the circuitry of connectedness and dependence within and between bounded systems offers the opportunity to move beyond the strait jackets of knowledge/no knowledge into learning to learn.

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1 | "Infinite linear circularity" arose out of a discussion in July 1971 between Engelbart and

« 6 » In his target article, Scholte draws from von Forester's eigenbehaviors, Pasks' conversation theory and Bateson's cybernetic epistemology to investigate the interrelations and ecology wherein the world and the observer co-create each other. Scholte understands that "[t]he logic of the world is the logic of the description of the world"; (Segal 2001: 1) in doing so, he illuminated a path that bypasses the trap of accounting for the black box of cognition and the totality of our mental faculties. Calling for research not on cognition but on the field of intelligence emergent between the black boxes of perceptions and cognition, Scholte states that theatre provides an ideal place for understanding the structuring of our dreams of reality in an environment that starts with the "willing suspension of disbelief" (Coleridge 1817: Ch. XIV).

« 7 » Scholte relies on Søren Brier's bio-cybersemiotic framework. Brier (2008) proposes a semiotic level that belongs to all living systems, and that serves as the scaffolding for "social language systems" (§42). Emergence of images and linking back to perception requires weaving of information based on differences making a difference to the whole system. Identification of the meta-patterns and how they constrain lower level functions would be a research objective of perceptual weaving and its holistic economy of relations. How information becomes entangled (develops) within the whole scaffolding as well as the potential for disentangling or "reverse engineering" complexity is a distinct possibility.

« 8 » For a theatre of theatre, Scholte ends his target article with this thought about the nature of the organization (read regulator) of information, communication that co-creates itself. Teasing out the complex interplay between eigenbehaviors requires the re-conceptualization of…

"naturalist theatre (and perhaps all representational art) as dealing in the generation of eigenbehaviors rather than laying claim to objective portraits of 'reality' and examine those eigenbehaviors through a cybersemiotic lens employing both quantitative data around meaning and believability and conservation theory reflecting the operationalized conceptual schema of characters, actors and ultimately audiences." (§61)

« 9 » The question remains of how to deal with black boxes of the unknown and whether there is a researchable pathway to super-sensible knowing and learning? Scholte's insight is that by researching processes (eigenbehaviors) through cybersemiotic and conversation theory in the terrain that is pre-scientific, we can complete the revolution of second-order cybernetics. The task of second-order cybernetics was to turn epistemology on its head. The question now is building on the constructivist revolution. What is tantalizing is that he points not to the secrets (the things) inside the black box but to relationship structures, understood both quantitatively and qualitatively, of the feedback loops of perception, deception and conception in the interactions between actors, audience and script.

« 10 » Scholte's method simply states there is a field of inquiry that can not only investigate itself but can learn about patterns of organization and relational symmetry in the very perceptual and conceptual processes that create stability of objects. Theatre of theatre opens the possibility of investigating eigenbehaviors as tokens of processes. These processes are the relationships, feedback loops and interactions between the black boxes of minds. This research would answer questions not just about what is present between the black box of minds but importantly the development potential for change and transformation in the circuitry of information and communication through which we organize the world. A theatre of theatre research agenda would document the processes in the development of structures of increasing complexity and improbability.

« 11 » The black box of unknown inner principles of change and stasis in living systems operates as a token of processes giving rise to fully formed objects. When we consider a pattern of patterns or cybernetics of cybernetics or the proposed theatre of theatre that fold back on themselves, we find there is a foothold for analysis. Louis Kaufman in his paper on von Foerster's eigenbehavior writes,

"Such concepts appear to close around upon themselves, and at the same time they lead outward. They suggest the possibility of transcend-ing the boundaries of a system from a locus that might have been within the system until the circular concept is called into being, and then the boundaries have turned inside out." (Kauffman 2003: 73)

« 12 » Ranulph Granville makes a similar point in his 1979 paper delivered at the London Cybernetics Society, "Inside Every White Box are Two Black Boxes Trying to Get Out," where he concludes:

"There comes, then, a point at which formal (artificial) systems, as we understand them, are limited by the distinction between level and meta-level. In terms of our (level distinctive) logics – themselves artificial systems – this distinction is sacrosanct. […] Thus, the black box model […] requires not only this change but also as one means for the establishment of eigen-behavior and hence, objects, the observer's ability to 'step outside' or transcend levels." (Glanville 1982: 9)

« 13 » The movement away from objects that are socially constructed and a world where everything is relative does not mean the world of mind simply floats on the whim of the dominant class or prevailing paradigm. Like the relative in a family, where faces bear a striking wholeness of relationship (like Wittgenstein's family resemblances), what constitute the structures are it's underlying differences. Identification of those patterns that connect and disconnect would be the heart of the research effort.

« 14 » Intelligence, perception, morphogenesis and in-formation are all eigenbehavior delineating processes that move upstream from science's world view to where objects are not objects of study but indications of processes – "the concatenation of operations upon themselves" (Kaufman 2003: 73) The unit of analysis is the two-way interactive co-creation of "organism plus environment" forming a structural coupling (Bateson 1999). The theatre of theatre would investigate structural coupling where the phase (transformative) space between meta-system scaffolding and operations, between organism and environment can not only be identified and studied but is regulatory functioning viewed.

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« 15 » Scholte's value-added proposition in creating a theatre of theatre second-order laboratory points towards a new, non-trivial paradigm. This paradigm requires heavy theoretical lifting and the design of new experimental questions and tools. Whereas the scientific method is analytic probing of the discrete *variables*, second-order methods seek the dual processes of the *whole* that

- *sustain* and provide stability over time, and
- have the capacity to *change*.

Change has many dimensions, including structural (morpho-genesis), change in ideas, habits, responses in behavior or in symbolic representations (ideo-genesis), or change niche/environment (eco-genesis). All three areas could constitute second-order research. The change from seeking variables in the slice and dice analytic of science and the unification of holistic systems design due to changes in its circuitry is a significant shift in the way we think.

« 16 » A voice from theatre is a strange place to listen for how patterns of organization and relational symmetry emerge, are sustained and evolve or dissolve. Black box theatre points in an important direction. Second-order rigor probes the circuitry of the entangled relationship of observers and the observer's co-creation. A method and tool of investigation emerges out of a hierarchy of levels of analysis incorporating the system of observer and observed. Establishing a theatre of theatre laboratory is fully consistent with the reflexive cybernetics of cybernetics, linguistics of linguistics, logic of logic, learning of learning or meaning of meaning.

« 17 » Scholte's article stands on its own as a strong argument that black box theatre research offers a new way of thinking about thinking with a potential to change how we approach knowledge, intelligence and evolutionary design of the world. In seeking constructivist foundations, Scholte's idea is that aesthetics and art may provide deeper insights into the nature of epistemological circuits, their closure as a system and their consequences. Improving the way we think requires entering into the pre-perceptual and pre-conceptual domain of the arts. When asked in Mexico in 1971 about the future of cybernetics, von Foerster gave

me a book, *The Dream that Was No More a Dream: Search for Aesthetic Reality in Germany, 1890–1945* (Kinser & Kleinman 1969). Witnessing Nazi Germany's Berlin during WWII, von Foerster's pioneering work in constructivism and cybernetics was driven by the epistemological bankruptcy of reason, rationality and its handmaiden, science. Countering the tyranny of certitude required tilting at science, truth and reality, but for von Foerster, Bateson and Kenneth Boulding (cf. his 1956, *The Image*), the future required probes into art countering construction of images, symbols and language that produced the "monsters of reason" (Segal 2001: 2).

« 18 » Theatre is uniquely positioned to provide methods and tools to understand consequences of differing configurations forming perception and conception. The koans embedded in what von Foerster accomplished in raising the specter of second-order cybernetics requires new experimental design and the heavy lifting of theory. Repeating what the pioneers of cybernetics and constructionism said means we roll their koans up a hill only to have them crash down. Beyond the mountains of truth/no truth and relativity lies a field of images, narratives and relationships with consequences. I will meet you there.

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Does Second-Order Cybernetics Provide a Framework for Theatre Studies?

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> Upshot · Scholte's attempt to link theatre studies with cybernetics faces at least two problems: historically, there could not have been any direct (mutual) influence between these two fields; and conceptually, do we need second-order cybernetics, and the concept of the black box in particular, to account for the Stanislavski system?

« 1 » I understand the intentions of the author, Tom Scholte, as an attempt to create a systematic relationship between Stanislavski's naturalistic theatre, his own theatre work and cybernetics, especially second-order cybernetics, with a focus on a well-known key concept of cybernetics, the black box.

« 2 » It is always welcome to see transdisciplinary cybernetics used either as a theoretical framework for the solution of a set of special scientific problems or entangled with other scientific disciplines. In fact, this applies not only to the sciences but also to various applied fields, including systemic therapy or consultancy schools, and, as it the case here, to various fields of the arts. Among many others who supported such an agenda were Heinz von Foerster, Gordon Pask, Ernst von Glasersfeld and Ranulph Glanville.

« 3 » Already in an earlier publication, Scholte (2015) tried to establish this relationship between cybernetics and the undoubtedly ingenious theoretician and practitioner of theatre, Stanislavski – who, besides Bertold Brecht, must be considered the most influential revolutionary in 20th century theatre. For an historian this opens up the problem of anachronism or the problem of a possible anachronistic fallacy (Fischer 1970) because Konstantin Stanislavski, who passed away in 1938, could definitely not have been aware of the development of cybernetics.

This took place in the 1940s and the 1950s, mainly carried out by Norbert Wiener, Warren S. McCulloch and the Macy Group, and the British cyberneticians, including Ross Ashby. Since Stanislavski's major works were published in the 1930s, we need to wonder what kind of relationship Scholte tries to establish, for it cannot be a relationship of influence or mutual influence. Even though I am aware of the fact that Heinz von Foerster, Ernst von Glasersfeld and Gordon Pask as well (and probably others) read some of Stanislavski's books, I cannot assume that he had any influence on the development of early cybernetics for, as far as I know, there is no literature in early cybernetics making any reference to Stanislavski.

« 4 » Besides this (for a historian) obvious criticism, there are other issues one needs to look into. One of them is the question of intellectual economy (or, if you will, Occam's razor *sensu* Hahn 1980): Of course, there are obvious parallels between Stanislavski and cybernetics – and Scholte tells us very interesting details about that – but is it actually necessary to adopt (second-order) cybernetics in order to understand, to explain, let alone to develop his conception of theatre, i.e., Stanislavski's system?

« 5 » Another example in Scholte's article, depicted in Figure 6, is the reformulation of a quite conventional theatre situation (with "characters in play," "audience member" and "researcher") as nested black boxes in the sense of Glanville (2012: 447) but with an additional time variable. There is no doubt that the concept of the black box is a fundamental theoretical instrument in the history of cybernetics. While it would be possible to demonstrate that there were predecessors, it is clear that the first full description and discussion of this concept goes back to chapter 6 of Ashby's *An Introduction to Cybernetics* (Ashby 1956). In Ashby's handwritten *Journal*, http://www.rossashby.info, we find a first entry concerning this concept in the year 1951. Glanville (2012: 42) suggested it was possible to trace the general idea of the black box back to James Clerk Maxwell. A similar suggestion was made by Heinz von Foerster when he used Maxwell's demon in his thought experiments related to his work on "self-organizing systems and their environments" (Foerster 2003b). In any case, the black box

has been one of the traditional concepts of (first-order) cybernetics that has often been used innovatively in new contexts, Scholte's article being one of them.

« 6 » Glanville (2009c, 2012), in some ways, broke with the traditions of cyberneticians' black box thinking and went considerably beyond it. One of his central innovative ideas was to ascribe to the black box the quality of being "whitened." By being "whitened," the black box becomes a white box. This clearly transcended Ashby's conception of a black box, which would always remain a black box, never to be opened and only to be hypothetically ascribed a specific function by an observer (or the experimenter coupling himself to the box, in Ashby's 1956: 87 terminology). In Glanville's terms, "whitening" the black box refers to the building of a circular system as a new whole that includes the black box and the observer, who provides a functional description of the black box. Glanville's approach takes into account that different observers may come up with different functional descriptions. The whitening of the black box also whitens the observer but the circular system they are forming appears again as a black box for a second observer. With this reformulation of Ashby's "Problem of the Black Box" (Ashby 1956: 86), Glanville turned the originally first-order cybernetics concept of the black box into a second-order cybernetics concept and made it a universal *epistemological* tool. But was it meant to be applied beyond epistemological questions, questions of what we can or cannot know, questions that were also formulated in von Glasersfeld's radical constructivism (Glasersfeld 2007)? I do not think so. Was it meant to be used for applied research, including social and psychological, and for problems emerging and being studied in theatre studies of the type Tom Scholte is doing? I have my doubts. The view that a concept, a theory is beautiful does not necessarily mean that it matches certain problems better than other or older concepts and theories. However, this does not mean that concepts and theories from second-order cybernetics cannot be successfully used – it must be carefully decided in which context they can be applied.

« 7 » With his target article, Scholte announces a research program accompanying his theatre work that could last for years. In

particular, this ongoing work could influence both theatre and research and might very well lead to lasting changes in concepts and theories as well. We shall remain curious.

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A Theatre for Exploring the Cybernetic

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> Upshot · The parallels that Scholte has drawn between cybernetics and theatre open up a new avenue for exploring cybernetic ideas. This complements the way that cybernetics has invoked design as a way of questioning the relationship between cybernetics and action.

« 1 » While Tom Scholte has concentrated on ways in which cybernetics can inform theatre, the connections that he has developed between the two fields are significant for being not ones of application but, rather, overlap, where cybernetic processes are seen to be being enacted within an already established set of practices. Scholte's bridge building is, therefore, suggestive of further possibilities, opening up a new avenue for exploring how cybernetics may be understood in terms of action rather than theory, and so as an active research tradition rather than one form of worldview amongst others. This is highly relevant to the context of this special issue and previous concerns in this journal with second-order science (Riegler & Müller 2014).

« 2 » One point of comparison for Scholte's target article is with the development of similar connections between cy-

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bernetics and design, such as in the work of Ranulph Glanville (e.g., 2007). This commentary is not the place to work through the various connections that can be made between design and theatre via cybernetics (a study that would be in the spirit of cybernetics' original trans-disciplinary agenda). However, reflecting on the parallels between Scholte's account and the invocation of design in cybernetic literature suggests ways in which the connections that Scholte has explored may be further developed.

« 3 » Scholte concentrates on the underpinning that cybernetics can offer to processes in theatre, for instance in moving beyond the theoretical impasse that he describes (§§5ff), and ways in which the use of ideas from cybernetics such as entailment meshes may enrich those processes (§§40f). There are several areas of design where, similarly, cybernetics can provide theoretical support, particularly as regards interactive technology (e.g., Spiller 2002) or the relation between design and research (e.g., Glanville 2015; Jonas 2007, 2015). Glanville's analogy between cybernetics and design is, however, notably two-way: "cybernetics is the theory of design and design is the action of cybernetics" (Glanville 2007: 1178). That is, design contributes back to cybernetics, such as where second-order cybernetics is understood in terms of the cybernetic practice of cybernetic ideas (Sweeting 2015), and where the overlaps between cybernetics and core aspects of design practice have allowed designers to contribute to cybernetics through their tacit understanding of such processes, rather than via theory (on this see also my contribution elsewhere in this issue; Sweeting 2016).

« 4 » Similarly, given the parallels that Scholte has suggested, and his quotation from Ashby (§4), we might expect ideas from theatre to inform or challenge ideas in cybernetics as much as vice versa – to provide a theatre, as it were, in which to explore the cybernetic. If the relations between cybernetics and theatre have not yet been explored in as much depth as those between cybernetics and design, there are, as with design, a number of clear parallels in existing work that can be drawn on. These include Heinz von Foerster's (2003c: 325ff) concerns with magic; the performance events that have long been part of the conferences of the American Society for Cybernetics (Richards 2015); and Andrew Pickering's (2010) interpretation of British cybernetics as what he refers to as "ontological theatre," where ideas are explored through their staging in experimental devices or other forms of practice. Central in Pickering's account is the work of Gordon Pask, who is also a key reference for Scholte. Scholte's concern with Pask stays close to the formal aspects of conversation theory, which he uses to make connections with the Stanislavski method (§§23ff). This is similar to the way that Glanville draws on Pask in building bridges between cybernetics and design (Glanville 2007, 2009b). Pask's oeuvre, however, suggests further possibilities for building the relationship between cybernetics and theatre. Pickering (2010) emphasizes the performative qualities of Pask's devices, through which he embodied his ideas in order to explore them in a way not unlike Scholte's (§§42ff) account of the stage as a modeling facility. Most explicitly, Pask was directly engaged in the theatrical, most notably with the development of the Musicolour device with Robin McKinnon-Wood (Pask 1971) and his substantial collaboration with avant-garde theatre director Joan Littlewood and architect Cedric Price on the Fun Palace project during the 1960s (Mathews 2007). By building on these connections, together with the analogies that Scholte has developed, theatre and cybernetics can offer each other mutual support in much the same way as cybernetics and design.

« 5 » Theatre provides a rich territory in which to explore epistemological and cybernetic ideas, and the laboratory that Scholte (§52) proposes is one such exploration. The varied ways of configuring the relationship between performers and those they perform to, and the possibility of interactive or self-reflexive arrangements, also offer a number of other possibilities. Even in conventional formats, theatre is a significantly interactive medium, compared to, say, film, because of the way that actors respond to the way that the audience responds to them (this is Pask's starting point in his collaboration with Littlewood[1]). Theatre therefore offers the potential for staging different epistemological relations that can be explored by participating in them from different observer positions: for instance, whereas Figure 6 shows a straightforward hierarchy, the audience or researchers may also find themselves within a play being observed by the characters, and so on.

« 6 » In this light, it is interesting that it is not clear where second-order cybernetics, with its concern with observer inclusion, would sit vis-à-vis the debate between naturalistic and anti-naturalistic approaches to the theatre that Scholte briefly mentions (§59). Both approaches are concerned with observer inclusion: on the one hand, an anti-naturalistic approach explicitly articulates our presence as observers and agents in the social setting of the theatre; on the other, it is in the naturalistic approach where we are caught up within the flow of the constructed world of the performance, identifying with characters and their situations. Whereas second-order cybernetics is often presented in simple opposition to first-order cybernetics, theatre's modeling of observer relations offers possibilities for exploring nuances of how our presence in our observing is configured.

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1| See Pask's unpublished report "Proposals for a Cybernetic Theatre" produced on behalf of Littlewood's Theatre Workshop & Pask's own System Research as part of the Fun Palace project. A copy of the document is archived in the Cedric Price Archive at the Canadian Centre for Architecture, Montreal, reference: DR1995:0188:525:001:009.

The Many Varieties of Experimentation in Second-Order Cybernetics: Art, Science, Craft

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> **Upshot** • Scholte proposes using the theatre as a laboratory for experimenting with ideas in second-order cybernetics, adding to the repertoire of approaches for advancing this way of thinking. Second-order cybernetics, as art, science and craft, raises questions about the forms of experimentation most useful in such a laboratory. Theatre provides an opportunity to "play" with the dynamics of human interactions and relations and possibly demonstrate value in second-order cybernetic thinking.

« 1 » Tom Scholte expresses concern that second-order cybernetics (SOC) is being marginalized within mainstream academia. The implication seems to be that if SOC was recognized as a legitimate and mainstream approach to science and design, it could contribute significantly to many types of human endeavor. Scholte proposes that the theatre could provide a laboratory for experimenting with ideas in SOC as a way to add some legitimacy and demonstrate value. I find this to be a novel and intriguing proposal and encourage its further development. Scholte has the unusual combination of expertise in theatre studies, directing and cybernetics necessary to pull it off. I am unsure how many people with these abilities and interests there might be; perhaps Scholte's work will stimulate more interest. In this commentary, I wish to question the prospects for, and even the desirability of, pushing SOC into "mainstream" academia.

« 2 » SOC is distinguished by the new questions it asks, not by the answers it might supply to current questions. Its legitimacy lies in the logic(s) embedded in these questions and the desirability of the consequences of exploring the questions further.

Its method is deductive. Looking for empirical support for cybernetics concepts in current systems is not of value in responding to questions about systems that do not yet exist, but that might be desirable if they did exist. The activity of designing and exploring new systems invokes the realm of the un-decidable question – questions only we can decide, questions of desirability. Artistic performance, as in the theatre, provides a vehicle for creating new systems and then experimenting with them. The form of experimentation, however, may not be in the tradition of the scientific experiment, where empirical results are used to support or oppose pre-formulated hypotheses and theories; on the contrary, the more appropriate experimentation might be in the form of "playing" with the dynamics of interactions and relations. Opportunities for playing with dynamics reside in the composition of the script/score; in the interactions among the actors, between actors and director, between performance and audience and among audience members and others; and in the scheduling of a performance as an event among other events.

« 3 » Experimental composition and experimental theatre are common subjects in university programs in the fine and performing arts. In fact, the movement arts, and all the arts, are experimental. Ideas are tried, consequences explored and new ideas generated. The controlled experiments of science, on the other hand, use the word "experiment" in a different way: scientific experiments are intended to prove or disprove an explanation of a current phenomenon. The controlled aspect of these experiments requires the specification of a current system in which the explanation will be tested. The idea of a craft merges art and science and adds action. For the craftsperson, the repetition of an activity – that is, learning through doing – could be regarded as a continuous process of experimentation: through practice, the craftsperson develops her craft.

« 4 » There is, of course, an art, science and craft involved in all these activities, but it is the focus on experimentation in the sciences that increasingly gives legitimacy to an academic field of inquiry. Cybernetics has always been trans-disciplinary, even anti-disciplinary, in approach, treating all systems (existing or imagined) as potential subject matter. The approach of SOC involves art, science and craft together, simultaneously and without bias. Mainstream science is disciplinary, empirical and oriented toward questions that can be decided through observation and controlled experiment. SOC does not belong in the mainstream and is not likely to carve out a place for itself there; rather, it provides an epistemology for an entirely different system of inquiry, one that focuses on the observers/listeners themselves, their ways of thinking, their desires and their interactions with each other. The hope of SOC is in the prospect of a new way of thinking and talking about our world, our society and ourselves.

« 5 » Why focus on experimenting with the "dynamics" of human interactions and relations when speaking of SOC? Three features unique to cybernetics come to mind.

Dynamics and relations

« 6 » Cybernetics attempts to address two domains of inquiry simultaneously: the domain of dynamics (experience) and the domain of relations (explanation) (Richards 2010, 2013). Bridging the domains requires the observer/listener to select a clock by which observations are to be made and explanations formulated. I use the word "clock" to speak of a way of sampling a dynamics. In science, the commonly accepted tradition is to select an external standard clock (years, weeks, days, hours, minutes, seconds, milliseconds and so on – equal increments based on revolutions of the earth around the sun, rotations of the earth on its axis or other fixed reference points, which self-referentially already require the selection of a clock in order to call them "fixed"), with the only choice being how often to record observations of states or structures in the phenomena being observed. For example, observing the growth of a culture in a petri dish requires a decision about whether to record observations every day, every hour, every ten minutes or some other interval (sampling rate), so that causal relations among the variables under consideration can be inferred from the changes in state or structure observed. Different sampling rates produce different relations, with different consequences for science, for the scientist and for the world that accepts the results. In the arts, many possible clocks (or con-

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ceptions of time) are employed or invoked, often without explanation or justification by the artist. For example, spray painting carries a different conception of time than splattering with a brush. Music plays with conceptions of time in the performer and the audience. Artists accept neither the regularity of time nor the desirability of the standard clock, preferring to challenge accepted notions of time. Invoking multiple conceptions of time can create an out-of-synch-ness among composer, performer and audience – a situation of conflict to be resolved and an opportunity for new ideas to emerge. This is the role of the arts in society (Richards 2010). SOC deals explicitly with the choice of clocks, placing responsibility for the consequences on the observer/listener.

Recursion

« 7 » Cybernetics deals with recursive processes and closure in the dynamics of operations of systems, rather than with the whole systems and open systems approaches more common in the sciences and humanities. SOC suggests that focusing on the dynamics of operations of systems – patterns of changes – can throw light on the human predicament in ways no current science does, but that it does so by including the observer/listener, and their selection of (a) clock(s), in the system of interest.

Conversation

« 8 » Cybernetics is enacted in conversation: a particular dynamics of interaction in a language such that the dynamics moves from an asynchronicity (a friction, conflict, contradiction, disagreement, being on a different plane, being out of synch) towards synchronicity (including agreement or agreement to disagree). This dynamics is the realm of SOC.

« 9 » I have often talked of the cybernetician as a craftsperson in and with time (Richards 2016). All artists manipulate time; the cybernetician does so thoughtfully and deliberately. For scientists to deviate from the standard clock in their research would be to insert, deliberately, the observer and the observer's desires into the system being observed. This would be a new science, one where the theatre and other arts could become a playground for research. At present,

this conception of science is so far removed from what is accepted that it makes little sense to push the SOC agenda onto it. SOC will become appreciated by the desirability of the consequences realized when people employ this way of thinking – namely, a reduction or elimination of violence. I use the word "violence" to speak of any action that reduces the participation of some by eliminating their choices and alternatives. I regard the reduction or elimination of violence as a consequence most of humanity (even if not all) could agree on as desirable and therefore what experiments with SOC need to demonstrate. The theatre is a place to practice and hone this craft.

« 10 » I would also like to make the case that SOC implies an approach to experimentation with language that is different from traditional approaches. Specifically, treating signs and symbols as fundamental units of analysis in the study of language, as in semiotic research, does not recognize them as objects generated by the very language being studied. SOC recognizes languaging as a process (the coordination of the coordination of action), with the language produced then serving as a medium through which the dynamics of a conversation can happen. If there is to be a unit of analysis in SOC experimentation, it should be the entire conversation. In theatre, the conversations could be those that actors or directors have with themselves – namely, those that generate thinking; those that occur on stage as modulated by a script or score; those between actors and between the actors and director in preparation of a performance; and those between actors/directors and audience, or between audience members, or between audience members and others not in attendance. In all cases, the opportunity is to play with the dynamics of interactions and relations. Characteristics to observe include amplitude, speed, frequency, rhythm, emphasis, pivots, events and, of course, synchronicities and asynchronicities, among others – anything that would distinguish a pattern of dynamics.

« 11 » In conclusion, Scholte lays out for us a challenge: let us advance SOC by doing it. Our ability to generate significance through scientific experiments on minds, societies and the world in general is limited by current conventions and resources and

complicated by constant change in conditions, factors and desires. The theatre (and all the arts) offers the opportunity to create micro-worlds where these complications can be accounted for and experimented with, without the same constraints of convention and resources that limit the traditional sciences. Current best available knowledge can be applied and the artist's skills brought to bear on the creation of a performance, while also applying the craft of the cybernetician. The results will speak for themselves. I look forward to hearing about the experiments, if not participating in them.

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Author's Response

"Playing With Dynamics": Procedures and Possibilities for a Theatre of Cybernetics

Tom Scholte

> **Upshot** · Operational concepts underpinning a proposed cybersemiotic theatrical laboratory are further refined while questions regarding its experimental orientation remain.

« 1 » I must begin this response with an expression of deep and sincere gratitude to the eight authors of the open peer commentaries and to the editors of this journal for facilitating their rich contributions to this project. The questions and comments they have provided have not only helped clarify my reflections on the work as it has proceeded thus far but have also played a pivotal role in inspiring and orienting its direction moving forward. My response will be organized along these two thematic lines under the categories "procedures" and "possibilities." In the context of this response, the term "procedures" is meant to denote both the particular research protocols queried by Bruce Clarke & Dorothy Chansky and the embodied cognitive operations of actors and audiences interrogated by Edgar Landgraf and Bernd Porr. Possibilities will reflect upon Larry Richards's and Ben Sweeting's suggestions for future directions of the overall project as well as Lowell Christy's endorsement of, and Albert Müller's objections to, its conceptual foundations.

Procedures

« 2 » Clarke & Chansky's request for clarification regarding the research protocols employed in the experiment described in §20 of the target article is well-grounded given the significant potential ramifications of the details in question. To clarify, the description of the two sets of performances (autopoietic and allopoietic) in §5 of their commentary is, indeed, accurate. The term "invite" in both instances refers to an invitation to "random people to show up" (ibid.) to a single performance put out through the social media outlets of the Theatre and Film and Psychology Departments at UBC as well

as personal invites from the investigators (Alan Kingstone and myself) and actors. Suspecting that the social media invitations were most likely to solicit the participation of university students, the personal invitations (targeted toward non-theatre specialists) were intended to introduce some diversity into our subject pool. Admittedly, the majority who attended would still fall within the categories of the WEIRD acronym (§6). They are also assumed to be relatively interchangeable in their competency as spectators of naturalistic/realistic theatre given its position of dominance within the field and the ubiquity of its modes of actor performance across the adjacent fields of film and television. As the authors indicate, more experimental aesthetic modes would likely introduce new potentially confounding influences (§7) but this was not a concern in this instance.

« 3 » As a description of the cognitive operations underpinning the kind of everyday social behavior that naturalistic theatre seeks to simulate, Porr's insistence on the appropriateness of forward modeling and open control loops provides a welcome conceptual refinement that is entirely compatible with the Stanislavskian notions outlined in the target article. Indeed, many moments of heightened drama occur precisely when the forward model that a character is depending on is perturbed and "these forward models fail […] and the feedback loops need to kick in" (§4). Furthermore, as referenced previously in Scholte (2015), Stanislavskian teacher/practitioner Uta Hagen tells us that, in life, while "[w]e never know what the next moment will be […] we always have expectations about it." "Utter spontaneity" onstage becomes possible when the actor can learn to "suspend knowledge of what [is] to come by unearthing the character's expectations" and let those expectations collide with what actually takes place "in the moment" (Hagen & Frankel 1991: 128). The forward model/open loop conception of the character's operations also seems compatible with an earlier cybernetic conception that proved useful in rehearsals for our experimental production of *Salt-Water Moon*: Warren McCulloch's postulated "redundancy of potential command" summarized by Gordon Pask as describing a set of "goal-directed subsystems" that "compete for dominance"

with the command position "shift[ing] from time to time in a way that favors the subsystem currently in possession of the most relevant information […] from the environment (or from the aggregate of subsystems, or both)" (Pask 2011: 528).

« 4 » Extending Porr's cocktail party scenario, an individual in attendance in order to seek a potential mate can fairly effortlessly engage in small talk relying on open loop forward models while the "search for mate" subsystem is highly attentive to feedback as he or she surreptitiously scans the room for potential candidates. In this sense, the subsystem currently in command may be engaged in a closed loop while the other subsystems necessary to continue to function successfully in the environment can "get by" on open loop forward models. That is, until the individual distractedly commits a conversational faux-pas and their partner responds in a perturbing fashion. At that moment, the "social damage control" subsystem will seize control, temporarily overriding the forward model of the conversational partner and closing the loop until the situation is satisfactorily stabilized and "search for mate" can resume the command position. Again, such moments are often the stuff of drama; or perhaps, more often, comedy.

« 5 » Regarding the film-based improvisational processes referred to by Porr (§9), both varieties have played a major role in my own artistic practice as I have been an actor/co-creator on three feature films developed in the mode of Mike Leigh (*Dirty*, 1998; *Last Wedding*, 2001; *Crime*, 2007) and a trilogy of films that, like *Victoria,* were entirely improvised based on objectives and given circumstances in a collaboratively developed treatment (*Mothers&Daughters*, 2008; *Fathers&Sons*, 2010; *Sisters&Brothers*, 2011). However, with a focus on circular causal interactions and increased observer agency for the audience, the level of directorial/editorial control in terms of shot selection, pacing, rhythm, size, etc. and the linearity of traditional editing strategies, I have not found the medium of film to be as fruitful an arena for the type of investigation I am carrying out as live theatre. Of course, it is possible to push against predominant, mainstream cinematic techniques and provide more room for the elements in which

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I am interested within the filmic medium, and it may yet find its way into this program of research. Certainly, improvisationally-generated films manifest performance modalities that are markedly different from traditional author-centred works and, like Porr, I would attribute this difference to the wider margins within which cybernetic self-organization can take place facilitated by these processes.

« 6 » Landgraf's incisive problematization of our notion of naturalness resonates productively with Porr's observation that "improvisation imitates everyday double contingency reduction and acts as a convincing demonstrator/simulator of how everyday communication emerges" (§8). In this vein, Landgraf's previous deployment of the manner in which Judith Butler "draws on the concept of improvisation to describe a person's practice of enacting his or her identity in terms of a complex interaction between individual doing and societal constraint" (Butler 2004: 16) in the monograph to which he refers (§2) provides a useful lens through which to view the "simulation" of the "everyday" that a second-order cybernetic conception of the naturalistic theatre might illuminate. In interrogating cultural norms around gender, Butler describes the manner in which women are expected to make manifest behaviorally a socially constructed model of sanctioned femininity as an "improvised performance in a scene of constraint" (Butler 2004: 1). While I do not wish to diminish, in any way, the depth, power, and specificity of the manner in which such mechanisms impact and oppress women in particular, I agree with what I take to be Landgraf's suggestion that the notion of "improvised performance in a scene of constraint" can be usefully extended to describe the inherent performativity of all manner of social identity lying, mostly unconsciously, at the center of our daily living. Landgraf tells us that Butler's vision of the highly circumscribed agency emerging when "individual 'doing' intersects with the particular social constraints it engages":

" [R]everses the causal link between doer and deed, giving primacy to the 'doing' rather than the doer. She asks us to conceive of agency (or, more precisely, of the mere appearance of agen-cy) as the *result*, not the source, of a continued, improvised practice. In this regard, improvisation's object of invention – the 'thing' created – is the improviser herself; for Butler, improvisation marks the simultaneous composition and performance of the 'doer'. " (Landgraf 2011: 18)

« 7 » The creation of "character" by an actor in the Stanislavskian mode is no different. This is why actors training in this tradition are constantly urged to let go of any notion of "character" as a consistent entity outside themselves that they must understand, describe, and then seek to recreate, and rather, simply to be "themselves" inside the given circumstances (i.e., constraints) of the text on both the level of the societal milieu represented by the fiction and the stylistic tendencies of the particular genre or author that shape the text itself. There is no "character," only a pattern of actions described by an observer as a "character." (Hence my invocation of the "black box" a la Ranulph Glanville.) What has made the Stanislavski system of acting the default "best practice" in the generation of nuanced and "life-like" performance is that it is these very mechanisms that lie at its heart. That the "life" these performances are "like" reflects and conforms to social constraints that are different, but just as constructed, as earlier historical periods is a point well taken. This overlap between the actor's work and the mechanics of "everyday double contingency reduction" identified by Porr is precisely what makes the naturalistic theatre such a rich field for second-order observation.

« 8 » Landgraf critiques Søren Brier's commitment to softening the constructivist stance somewhat by embracing the "notion of reality that is thought to exist – and exist with definable qualities – independent of its (semiotic re)construction by an observer" (§6). Nevertheless, I remain sympathetic to Brier's position and persuaded by his argument that, without some degree of external invariance, the generation of an *eigen-object* would not be possible (Brier 2008: 105). It is enough to acknowledge that our access to this external environment is indirect and our descriptions of it the inferential constructions of closed systems. Even Ernst von Glasersfeld himself comes close to admitting as much when he speaks of

the "obstacles" and "constraints" within our environment with which we "clash" even if this does not tell us "what the obstacles *are* or how a reality consisting of them might be structured" (Glasersfeld 1995: 73, italics in original). My embrace of Brier's softer position does not represent a capitulation to the tendency in the contemporary humanities, rightly identified by Landgraf, to embrace embodiment as a "foundational" position from which to fend off constructivist skepticism of various stripes. At the very heart of my proposal is the intention to interrogate the manner in which the *eigen-behaviors* Landgraf eloquently describes as "stability that on the level of interaction between nervous system and psychic system is the result of long term, evolutionary processes" (§8) are hijacked and repurposed to serve hegemonic power structures that rely, largely, on the symbolic arsenal within the system of communication. Even though, as Landgraf points out by way of Niklas Luhmann, "[a]nything we observe […] will have to draw on the operations of the system of communication to do so" (§7) Luhmann is also open to the idea that systems theoretic functional analysis

" can clarify 'latent' structures and functions – that is, it can deal with relations that are not visible to the object system and perhaps cannot be made visible because the latency itself has a function. " (Luhmann 1995: 56)

Luhmann goes on to point out that "[t]he more starkly a system is hierarchized, the more clearly do forms whose latent function is to protect hierarchy's need for latency stand out" and that

" [c]onsciousness can undermine social latencies when it forces communication, and communication can sabotage psychic latencies, especially in the form of communication of a person who is defined as seeking to protect and conceal personal latencies. " (ibid: 336f)

(Perhaps this is the manner in which systems boundaries are "turned inside out" in the passage from Louis Kauffman cited by Christy in §11). I count the undermining of such latencies among the cybersemiotic theatre's possibilities and certainly among the desires I have for its use.

Possibilities

« 9 » While I have great respect for Müller as an esteemed historian and theorist of cybernetics, I fear that, in this instance, he has completely misconstrued my main arguments. At no point in the target article or in the previous one that he mentions (Scholte 2015) do I make the claim that Stanislavski could have been influenced by cybernetics. When one looks at the dates of the two bodies of theory in question, as Müller has done, it is obviously a question of basic mathematics. Neither do I suggest that the early cyberneticians were influenced by Stanislavski. As Sweeting cogently observes,

❝the connections that [I have] developed between the two fields are significant for being not ones of application but, rather, overlap, where cybernetic processes are seen to be being enacted within an already established set of practices.❞ (§1)

That Stanislavski's independently and previously developed theory of human behavior, completely absent the influence of what would become cybernetics, could so closely mirror the latter is precisely the point. As to Müller's question regarding the appropriateness of my redeployment of Glanville's black box as "epistemological tool" (§6), I am not sure what kind of issue observer-dependent distinctions, beginning with the naturalist author, through the naturalist actor and director and, finally those of "believability" and "meaningfulness" indicated by audiences of naturalistic theatre, would be if not epistemological; an issue with which the "other and older concepts" Müller suggests might "match better" have been inadequate in coping as the target article seeks to detail. It is also not my intention to "adopt (second-order) cybernetics in order to understand, to explain, let alone to develop [my] conception of theatre, i.e., Stanislavski's system" (§4) or to "replace" Stanislavski's original formulation with cybernetics. Rather, I am suggesting that, if the implicit cybernetics of the naturalistic theatre (including Stanislavski's approach to its performance) is made explicit, it can facilitate *new* uses of the naturalistic theatre as an instrument of cybernetic inquiry. But perhaps I have unwittingly created some of this confusion regarding my intentions myself by mingling second-order cybernetics with empirical experimental psychology as it has been traditionally practiced. This is an error that might be well avoided in light of the persuasive corrective offered by Richards and augmented by further analysis from Sweeting.

« 10 » Sweeting's citation of "Pickering's (2010) interpretation of British cybernetics as what he refers to as 'ontological theatre,' where ideas are explored through their staging in experimental devices or other forms of practice" (§4) is particularly apt vis-a-vis this research project. The autopoietic generation of a performance score by actor/characters engaging in what Stanislavski describes as goal-seeking behavior can be read as an analogue of Ross Ashby's multi-homeostat setup, which "stages for us a vision of the world in which fluid and dynamic entities evolve together in a decentered fashion exploring each other's properties in a performative back and forth dance of agency" (Pickering 2010: 106). The director of such a performance finds himself in a position similar to Ashby, whose

❝atomic knowledge of the individual components of his machines and their interconnections […] failed to translate into an ability to predict how aggregated assemblages of them would perform. Ashby just had to put the units together and see what they did.❞ (ibid: 108)

(Remembering, of course, the circumscribed nature of "agency" thematized by Butler, mirrored by the fact that, while unpredictable, the behaviour of the multi-homeostat setup is, at bottom, deterministic on a mechanical level.) Sweeting's assertion that a cybernetic investigation of theatre might work together with related trends in cybernetic design research in "opening up a new avenue for exploring how cybernetics may be understood in terms of action rather than theory, and so as an active research tradition rather than one form of worldview amongst others" (§1) takes on an increased poignancy when contextualized by the experimental vision sketched by Richards and in conversation with Müller's theoretical reservations.

« 11 » Richards captures the spirit of my enterprise thus far as a proposal that "the theatre could provide a laboratory to experiment with ideas in SOC (second-order cybernetics) as a way to add some legitimacy and demonstrate value" but questions "the prospects for, and even the desirability of, pushing SOC into "mainstream" academia." He suggests instead that "SOC is distinguished by the new questions it asks, not by the answers it might supply to current questions" and that a more "appropriate form of experimentation" for the theatrical laboratory that I am proposing "may not be in the tradition of the scientific experiment, where empirical results are used to support or oppose pre-formulated hypotheses and theories;" but rather "in the form of 'playing' with the dynamics of interactions and relations" (§2). This is an appealing and accurate description of the kind of activity I most definitely have in mind; however, my current interest is less "in responding to questions about systems that do not yet exist, but which might be desirable if they did exist" (ibid) than it is in shedding light on pathologies in existing systems through cybernetic analysis of the processes of their representative embodiment and observation in naturalist drama; as well as potential pathologies in the processes themselves. (Of course, over the arc of an extended research project, the latter may well end up facilitating the former.) This is why I have confined my focus to more traditional theatrical forms and, thus far, not engaged with the experimental theatre lineage of Pask referred to by Sweeting (§4), as rich and valuable as it certainly is. Similarly, it has led me to side-step the excellent work on purely improvised performance by Keith Sawyer alluded to by Landgraf although the themes emergent across the commentaries have led me to reconsider him as an important potential source of insight into Landgraf and Porr's overlapping conceptions of improvised identity and "everyday double contingency reduction" discussed above. The same could be said of the "frame analysis" work of Erving Goffman and its foundational role in the rich literature of symbolic interactionism. Richards's admonishes that "SOC will become appreciated by the desirability of the consequences realized when people employ this way of thinking" (§9) and to just get on with "advance[ing] SOC by doing it" in "microworlds […] without the same constraints of convention and resources that limit the traditional sciences" (§11). This is a powerful and persuasive message that I am consid-

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ering deeply as I ponder the next phase of this work. Such a micro-world may indeed be a more effective venue in which to "demonstrate the value of cybernetic thinking" (Upshot) while, perhaps, also avoiding some of the philosophical features of the current project that Müller finds disconcerting. But what might be sacrificed through disengaging with mainstream science in areas such as psychology, with its extensive literature on areas of cognition that have long been a part of cybernetic inquiry? Is the emergence of "a new science, one where the theatre and other arts could become a playground for research" such a long shot (Richards §9) that we should embrace and entrench our position on the margins with deliberate purpose? Perhaps. But another strand of cybernetics-inspired theory, touched upon by Christy, offers a language through which a long-ago called-for but as yet undeveloped science might be explored: Kenneth Boulding's eiconics or science of the image.

« 12 » Around the middle of the last century, two books emerged from Stanford's Center for Advanced Study in the Behavioral Sciences; the second, George Miller, Eugene Galanter and Karl Pribram's *Plans and the Structure of Behavior* (1960), offered as a direct and complementary response to the first, Boulding's *The Image* (1956). Boulding's book laid out his conception of the Image as "what [one] believe[s] to be true; [one's] subjective knowledge. It is this Image that largely governs [one's] behavior" (Boulding 1956: 7f). The Image is subject to the impact of "messages" that "consist of *information* in the sense that they are structured experiences. *The meaning of a message is the change which it produces in the image*" (ibid: 7, italics in original). Each individuals image is composed along the following dimensions:

- Spatial (location in space)
- Temporal (the stream of time and his place in it), relational (universe as a system of regularities)
- Personal (individual in the midst of persons, roles, and organizations)
- Value (scales of better or worse)
- Affectional/emotional (various items imbued with feeling or affect)
- Division of conscious/unconscious/subconscious, certainty or uncertainty/clarity or vagueness, reality or unreality

(degree of correspondence between image and "outside")
- Public/private scale (degree shared by others) (ibid: 47).

The role of "value" as well as "fact" in this subjective knowledge structure is critical.:

" At the gate of the image stands the value system demanding payment. This is as true of sensory messages as it is of symbolic messages. We now know that what used to be regarded as primary sense data are in fact highly learned interpretations. We see the world the way we see it because it pays us and has paid us to see it that way. " (ibid: 50)

« 13 » Miller, Galanter, and Pribram pick up this conceptual thread and offer their notion of a "plan" as "any hierarchical process in the organism that can control the order in which a sequence of operations is to be performed" and link them to Boulding's Image in the following reciprocal manner.

" Changes in the Images can be effected only by executing Plans for gathering, storing, or transforming information. Changes in the Plans can be effected only by information drawn from the Images. " (Miller, Galanter & Pribram 1960: 18)

« 14 » Before concluding his book, Boulding calls "half tongue in cheek" for the founding of a new science he dubs "eiconics" to study "the formation of images, the impact of messages, and the consequences of images for behaviour" (Boulding 1956: 172). Such a science would be intrinsically designed to operate on a second-order level of analysis as "[w]e can examine consistency, coherence, survival value, stability, and organizing power in the image, because the image can investigate the image" (ibid: 174). If "a new science" in which "the theatre and other arts could become a playground for research" is to coalesce, the framework of eiconics developed over these two books might be a place from which to begin. Why Boulding chose a stance of only half-seriousness to float this conception can, of course, only be a matter of speculation. My guess is that it served as a pre-emptive defensive maneuver by a man who knew only too well how both radical and unformed his thinking was in this particular instance and who feared the derisive scorn of the

mainstream academics with which he was more regularly in contact. Moving towards this endeavor from a position of artistic practice rather than economics, I consider myself fortunately less vulnerable to the kind of professional price Boulding might have been asked to pay and am unashamed in suggesting that we take up his proposal in earnest. (In fact, the authors of the second volume acknowledged that, traditionally, artists were the ones best equipped to carry out such a project (Miller Galanter & Pribram 1960: 214). The expansive vision in which this proposal is enveloped is articulately captured in Christy's commentary and I can add little to it other than my humility in the face of its vast aspirations. Whether this new field would retain the identifier of "science" or, as Boulding suggested was likely, opt for the descriptor "discipline" (Boulding 1956: 160–163) depends largely on the kinds of considerations raised by Richards. His idea that a cybersemiotic theatre laboratory that featured "the scheduling of a performance as an event among other events" (§2) might best facilitate fruitful experimentation is a practical suggestion worth considering. An event designed to "demonstrate the value of second-order cybernetic thinking" is likely to resemble something quite different from a typical evening at the theatre and may well benefit from built-in para-theatrical components to facilitate the type of second-order reflection desired. The development of such new paradigms is likely to require a Stafford-Beer-sized imagination. It is this reflection that brings me to my concluding thoughts.

« 15 » In closing, I would like to address Müller's suggestion that my project demonstrates a lack of "intellectual economy" and that, perhaps, I have been seduced by the beauty of a theory that does not survive Occam's Razor when applied in the manner that I am suggesting (§§4, 6) My response takes the form of two questions that I have found myself asking. What was the coalescence of cybernetics itself if not an exercise in stretching descriptions across domains and testing their elasticity, perhaps to the breaking point? And how has the field continued to grow and renew itself if not for the further stretching of "beautiful theories" beyond the margins of Occam's Razor from Stafford Beer's claim that an organization the size of a national government could be

modeled upon the human nervous system to Luhmann's endlessly controversial extension of the theory of autopoiesis into the realm of social systems to the audacity of Glanville's claim that science itself is in fact a restricted subset of design that is, in turn, the embodiment of cybernetics? It no way is my intent to place myself, and my endeavor, on the same level as these giants of our field. It is, rather, to point out that if my proposal entails some rather radical, perhaps questionable, extensions of existing concepts, it is largely because I have been so profoundly inspired by the daring cyberneticians of the past, who have cleared the intellectual space for entirely new forms of thinking. Certainly, this flair for theoretical eccentricity has fueled the recurrent accusation that cybernetics is not a genuine science but rather an elaborate system of analogies (Medina 2011: 11); but, perhaps, we should simply follow Richards's lead and happily surrender the scientific claim altogether. Either way, I am grateful that, in spite of his misgivings about its intellectual foundation, Müller feels that my "ongoing work could influence both theatre and research and might very well lead to lasting changes in concepts and theories as well" and that he "shall remain curious" (§7). To some, Beer's Cybersyn project might stand as a singularly spectacular quixotic failure. And yet many continue to sift through the detritus of its collapse for lessons that might still serve us well. In this spirit, I will endeavor to follow the admonition borrowed by Ranulph Glanville from Samuel Beckett: Try Again, Fail Again, Fail Better.

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