The International Society for Ecological Psychology

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International Conference on Event Perception and Action (ICEPA7)

Vancouver
August 8-13, 1993

We've had an eventful year, beginning with the Seventh International Conference on Event Perception and Action (ICEPA7) in Vancouver, August 8 - 13, 1993. As many of you know, this was a "grand" experiment. Never before had we selected a meeting site on any grounds other than its being the home ground for the organizer(s). This time, we tried out the idea of selecting a site according to its apparent attractiveness as a meeting place (together with other criteria -- e.g. it was North America's turn). This seemed to work, insofar as quite a number of people took the opportunity to explore the north and west of the North American continent either before or after the meeting.

Opening Event: Presentation of the ISEP Lifetime Achievement Award to Jackie Gibson.

On Monday morning, August 9, we began the meetings by presenting the ISEP Lifetime Achievement Award to Jackie Gibson. This is the first time the award has been given.

The citation on the plaque states that the Society presents its Lifetime Achievement Award to Eleanor J. Gibson

> "For her pioneering and fundamental contributions to the scientific understanding of learning, perception, reading, perceptual learning, and perceptual development.
>
> "For her leadership in the creation of ecological psychology as a field concerned with perceiving and acting in a meaningful world. "

Events at the meeting. There were 18 symposia, approximately 125 posters, at least 6 evening discussion groups, and not enough t-shirts. Claudia Carello created an ecological psychology / Northwest Native American design for the t-shirts. John Pittenger made the arrangements for their production and distribution at the meeting.

The evening discussion groups provided a less formal setting for people with common interests to share information. In order to handle the large number of people wanting to make points, Claire Michaels arranged for participants in her Tau discussion group to make short summary statements. All those who wanted to make a point did so before the general discussion. This was by no means the only lively session, but it certainly was a focal point of interest on Wednesday night. John Flach got to make his point that Tau results may often reflect more about the braking process itself than about ongoing perceptual control. Lee Gass' data on the pattern of hummingbird approach to a stop was provocative.

People who attended any of these sessions would do well to give their reactions to Ben Bardy to help the planning for the next conference. Are these sessions desirable? What formats worked best?

For the second conference in a row, a major effort was made to produce a useful book based on the poster presentations, a book that would be available at the beginning of the conference. Stavros Valenti, with help from students and colleagues at Hofstra University, then with added help from John Pittenger, collected, edited, and computer - typeset the volume. Lawrence Erlbaum Associates produced the final copies with their imprint. Stavros also produced the Program book for the meeting. The Poster books are excellent sources of information about the scope of ecological research --- who's doing it, what they are doing, and what the key references are. They are appearing as texts in a number of courses and, at their new low price, should be quite a useful item.

There is an ad at the back of this newsletter describing how to obtain a copy of the book for $15 (U.S.) by

writing to me (Bill Mace).

After the last symposium on Friday, there was a tasty and sumptuous dinner of barbecued salmon to accompany a private showing of the world famous UBC anthropology museum. Some participants said they intended to return to Vancouver some day just to spend more time there.

Business meeting. Wednesday morning (August 11) was the first under our revised bylaws, calling for elections to be conducted every two years at our Biennial International conferences. The people in the first column of the following table of Board members were elected this time:

Newly Elected (Terms expire '97)	Terms expire '95
Reinoud Bootsma	Flach
Claudia Carello	Fowler
Alan Costall	Guski
Eleanor Gibson	Mace
Anne Pick	Michaels
Sverker Runeson	Mingolla
Tom Stoffregen	Shaw
	W. Warren, Jr.

Benoit Bardy, of the University of Aix - Marseille, Faculty of Sport Sciences, Marseille, France, announced his willingness to succeed John Pittenger as conference organizer and to see to it that the 1995 conference is held during July of 1995 in Marseille. More details will be provided later.

In the remainder of the business meeting, representatives of our various international subdivisions (Britain, The Netherlands, Germany, Europe, and Japan) were acknowledged. The Japanese group, being organized by Masato Sasaki, will be the newest or our regional groups.

Just before adjourning for the day's program, Bill Warren raised a question about the title of these International meetings. He proposed that the name be revised to the International Conference on Perception and Action to avoid uncertainties about whether or not traditional ecological topics like surface perception belonged. The further presumption would be that the traditional topic of event perception, underscoring the central role of Gunnar Johansson and the history of the conference, would continue to be central and is included in the "action" part of the title. Thus, Warren's proposal was meant to be inclusive and clarifying, and was not meant to change the focus of the conference.

No formal action was taken. It was evident that once people started to consider new names, that a host of considerations could arise that could be debated without convergence for quite a long time. Nevertheless there was clear overall agreement with Warren's proposal.

Judging from the tenor of agreement, Ben Bardy has chosen to go ahead and designate the successor conference in Marseille ICPA8.

Please send comments to me (Bill Mace) or to any member of the Board of Directors.

The credit for the overall quality of the program and (apparent) smooth functioning of all the proceeding goes to John Pittengr. Once the organizing process was well underway, Stavros Valenti pitched in with invaluable assistance. They couldn't have performed without the excellent cooperation of the professional staff at the University of British Columbia Conference Centre, but the burdens fell most heavily on John. Even though one or a very few people have carried a heavy load in organizing every International meeting (Bill Warren and Bob Shaw; Joe Lappin; Sverker Runeson; Walter Gerbino; Len Mark; Reinoud Bootsma, Peter Beek, and Piet van Wieringen respectively), it seemed that John Pittenger carried even more. I hope people who appreciated the meeting will say so to him.

International Conference on Perception and Action (ICPA8)

Marseille, France
July 1995

The International Society for Ecological Psychology and the Faculty of Sport Sciences of Aix-Marseille University are sponsoring the Eighth International Conference on Perception and Action, which will be

held in Marseille, France, in July 1995.

This conference will present paper and poster sessions on a wide variety of topics, including, but not limited to, optical information for the control of locomotion, dynamical themes in perception and action, event recognition, ecological psychology and artificial intelligence, ecological approaches to acoustics, and ecological approaches to illusions.

To be placed on the mailing list for the call for papers or for further information, contact:

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1993 North American ISEP Meeting

October 15 - 16
Smith College
Northampton, MA USA

Peter Pufall, along with Mary Flesher and Don Reutener, organized our fall meeting at Smith College -- during the height of the colored leaf season. Both Jackie and Jimmy Gibson began their academic careers at Smith College, and Kurt Koffka and Fritz Heider taught there as well. The program was designed to touch on all these historical connections. On Friday, Bob Shaw gave an account of the philosophical background of the New Realism, a philosophical movement affecting James Gibson through his teacher, E. B. Holt. Shaw made a special point of the earlier pivotal role of Alexander Bain. Darren Newtson then described the work of Fritz Heider (more about this below).

Saturday began with a symposium on the role of developmental psychology in ecological psychology, featuring Jackie Gibson, Anne Pick, and Nancy Rader, all Smith graduates. The remainder of the day consisted of the following talks: The Development of Reaching in Infants (Rachel Clifton), Planning Reaches Based on Affordances (David Rosenbaum), Visual Guidance of Rapid Target Reaching (Geoffrey Bingham, Jennifer Romack, and Michael Stassen), An Ontology of Affordances (John T. Sanders), Man as Scientist: The Operant Concept of Human Nature in the Developmental Psychologies of Bain, Preyer, and Koffka (Mary Flesher), and Haptic Perception of Limb Orientation (Christopher Pagano).

Abstracts of the papers by Sanders and Pagano appear later in this newsletter.

NEWTSON OFFER -- In a very gracious gesture, Darren Newtson has offered to make available, to anyone who wants it, a videotape copy of the famous 1944 film by Heider and Simmel. He can be reached at the Department of Psychology, University of Virginia, Charlottesville, VA 22903 - 2477. His email address is dln@virginia.edu.

Primacy of Action
An Advanced Interdisciplinary Workshop

13-15th December 1993

Ashburn Hall/Department of Psychology
Manchester University

Human activity is a research focus for workers in a wide variety of fields. In the autumn of 1991 we held a workshop on situated action in Manchester. It was attended by psychologists, social anthropologists, economists, sociologists, archaeologists and cognitive scientists. The topics discussed included nature contexts of activities, coordination in joint activities, planning of activities at various orders.

This second workshop aims to bring together researchers for whom the concept of activity is the primary theoretical construct, with a view to exploring commonalities and differences in their research practices.

Workshop organizers are Alan Costall (Psychology, Southampton), Ivan Leudar (Manchester) and Wes Sharrock (Sociology, Manchester)
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CONTRIBUTED ESSAY

"Natural", "real", and the use of non-physical displays in perception-action research

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This essay has two points of origin, which seem to me to be closely related. First is what I see as some muddiness in contemporary use of words such as "real" and "natural", both within and without the ecological approach. The second is what I take to be an important conceptual problem in our understanding of what, exactly, is specified by simulations (mainly, but not exclusively, computer-generated optical displays) that are becoming increasingly popular in laboratories.

Natural and real

In the early days ecologists were at pains to point out that many laboratory situations were not representative of the "real world" or of "natural" or "real life" situations. The common arguments were that the stimulus information was impoverished and that there was an "unnatural" dissociation of perception from action. These were necessary arguments (and too often still are), but they may have had an unfortunate side effect. Nowadays things have improved to the point that we advertise naturalness and realism as assets, in our laboratories and in our analyses as well. Much is made of the "natural" relations between, for example, the dynamics of physical events and the kinematics that are available to perceivers. It is asserted that for "natural" events there is a particular kind of correspondence between events and the information for events, and that this correspondence may (or may not) be preserved in particular laboratory experiments. Certain displays or methodologies are characterized as being more natural than others.

My concern stems in part from a failure to define terms carefully. What, exactly, is meant by *natural* or *real* ? These terms are rarely defined. When we refer to a computer display as unnatural or unreal, what do we mean? Likewise, what, exactly, is unnatural about a given laboratory situation? Often the terms are defined in narrow senses (e.g., "the other researcher's experiment was unnatural because viewing was restricted to a peephole"); general definitions are vanishingly rare.

Of the possible definitions two are relevant here. In one, *natural* and *real* are used to mark the distinction between typical and atypical. In daily life perception-action coupling is the rule, so that forcing a participant to use a bite bar while making verbal judgments about blips on a screen is atypical or unrepresentative. While this definition is convenient it is not rigorous, and I think it cannot be. What is typical for one person is atypical for another. More to the point, what is typical for one task is atypical for another. I can think of a number of "real" occupations in which the "natural" coupling between perception and action is disrupted or absent. Radar operators, perhaps, or all of us millions who watch television, or anyone who observes just about anything for that matter, be it a movie, ballet or symphony. Appreciation of television and some forms of music is enhanced by maximizing the stasis of the observer. Are these activities/situations unnatural or unreal? It might be argued, with some justification, that while these activities are real and natural for contemporary humans, they did not form part of our evolutionary environment, and so played no part in the development of our perception and action capabilities. The problem is that this begs the question of just what qualifies as being part of our evolutionary environment. It implies that there are basic differences, from a perception-action point of view, between "natural" things and "artifacts" (e.g., Walker-Andrews, Bahrick, Raglioni, & Diaz, 1991). I think such a distinction could not be sustained.

In the second implicit definition *natural* and *real* are defined in terms of the correspondence between representations of physical events and the actual physical events. For example, Runeson (1975; Runeson & Vedeler, 1993) applies the terms "natural"

and "realistic" to optical motions (computer-generated CRT displays) that are derived from constraints on physical events, such as elasticity (which constrains the motions of physical collisions). An implication of this view is that events not so constrained are "unreal" or "unnatural". That is, displays that are generated in accordance with constraints on physical motion would be considered natural, while displays that were generated without reference to these constraints would be considered unnatural. My contention is that this definition cannot work.

Cartoons and the physical world

The above definition implies that events that are constrained by one set of laws and events that are constrained by another may differ in ways that are important for perception. That is, we might predict that the two types of events would be perceived differently, or that one would be more or less difficult to perceive than the other. This would have to be a general claim; that all "unrealistic" displays would have to be different from all "realistic" displays. I do not believe that this is true. As an example, consider children's cartoons. These depict events that could not transpire in the physical world (in a world of mass, inertia, friction, elasticity, and so forth). Yet children exhibit no difficulty in appreciating what is being depicted; they easily perceive the characters to fly, transmogrify, split in half, stretch like rubber, or blithely survive mortal wounds (think of the things that Wile E. Coyote has survived in pursuit of the Roadrunner). Millions of viewers love cartoons and are not troubled in the slightest by the depicted departures from physical possibility. Cartoons certainly are "natural" for children (those with access to television). What is typical or socially natural need not correspond to physical laws (here the two candidate definitions conflict). The fact that cartoons are confined to television and movie screens makes them non-physical, but it does not make them unreal or unnatural.

I contend that the important distinction is not between natural and unnatural, but between physical and non-physical. This obliges me to define *physical*. I define it as any event, process, or object that is inescapably constrained by such properties/forces as inertia, friction, elasticity, and so on. Rocks, trees, people, the wind, and bacteria cannot escape these laws and constraints, but the events on computer, television, or cinema screens can. The former are physical, the latter non-physical. Yet they are equally real, equally perceivable. An implication of my view is that non-physical events are specified as such. Another is that they may be perceived as such. These issues are taken up in the next section.

Non-physical displays are specified as such

The above discussion is related to the question of the appropriateness of using non-physical displays to study the perception of physical events. Ultimately, this gets into the general issue of generalizability between any laboratory situation and the non-laboratory situations to which it is compared. There was a sort of debate about this in one session of the 1987 event conference in Trieste (in which Sverker Runeson and James Cutting figured prominently), but the issue has come up in other places (Kaiser, Proffitt, Whelan, & Hecht, 1992; Proffitt & Kaiser, 1986). For example, it is of fundamental importance for designers and users of aircraft simulators (Riccio, in press).

Non-physical displays have an existence that is independent of any intended relationship to physical events. That is, they exist as pictures on a screen, or sounds from a speaker, or whatever (cf. Gibson, 1979/1986, chapters 15 and 16). As with cartoons, the fact that a non-physical display does not correspond to a physical event does not make the display unreal. The non-physical display is real (just as a painting is real). The motions (optical or otherwise) that make up the display are real. The stand-alone status of the non-physical display, its existence as *what it is* independent of *what it is intended to resemble*, should be specified in the patterns of light, sound, inertial stimulation, etc., to which it gives rise. Accordingly, there will always be information for the non-physical display as such (while non-physical displays typically are unimodal, the information specifying their non-physical status may be intermodal; Stoffregen, 1990; Riccio, in press). This is consistent with the ecological first principle of a unique, one-to-one correspondence between reality (whether physical or non-physical) and the patterns of energy (potential perceptual stimulation) to which it gives rise. Thus, following Gibson (1979/1986), it could be argued that all research relying on non-physical displays is fundamentally research on the perception of depictions rather than the perception of physical objects and events. For this reason I will refer to *depictions* henceforth

rather than to *displays*.

The comfort with which children perceive "impossible" non-physical events in cartoons implies that they are perceiving these "simulations" as such, and suggests (to me) that participants in our laboratory experiments way well be doing the same thing (cf. Proffitt & Kaiser, 1986). That is, participants may perceive the depiction as a non-physical event, even when they may understand that it is supposed to resemble (or that they are supposed to respond to it as) a physical event. It is possible to perceive the non-physical depiction as such and simultaneously perceive the physical event that is being depicted (neither one of these requires conscious awareness), as Gibson (1979/1986) noted. But responses to the depiction may not be the same as responses to the physical event (cf. Riccio & Stoffregen, 1991). The problem is especially acute when the non-physical depiction is intended to depict physical motion of the participant (Riccio, in press). In this case the participants' sensitivity to the non-physical depiction as such is especially salient (again, this need not be manifested in consciousness), but the problem has the same logical (and, likely, empirical) status for any situation in which non-physical depictions are intended to be responded to as if they were physical. These comments apply to visual or acoustic depictions that are intended to simulate self motion. Related but different issues arise when the "simulation" includes imposed inertial displacement (physical motion of the body). There is still a problem of the simulation being specified as such, as a thing different from that which is simulated (Riccio, in press; Riccio & Stoffregen, 1991; cf. Runeson & Frykholm, 1983, on faking). However, imposed whole-body motion is physical, rather than non-physical (as in an optic flow field), and so it is not relevant to the confusion between physical and non-physical events.

Often there are intentional departures in a non-physical depiction from the related physical event. Non-physical depictions sometimes are used because it is only with these that such departures are possible; the departures are viewed as necessary for the controlled evaluation of potentially informative parameters of stimulation. What is less often recognized is that such intentional departures provide information (in the ecological sense of a one-to-one correspondence between stimulation and reality) for the fact that what the participant is observing is not a physical event. Warren, Morris, & Kalish (1988) created a non-physical depiction that was intended to simulate motion of the observer (optic flow). Many properties of optic flow that arise from translation through the physical environment were included in the depictions, but some were intentionally left out. For instance, in any terrestrial environment there will be changes in the size and shape of the images of individual objects or texture elements as these move relative to the point of observation; for good theoretical reason these changes were not included in Warren, et al.'s depictions. The resultant depictions, therefore, did not specify motion of the observer through a terrestrial environment of physical objects and surfaces. Similarly, Gilden & Proffitt (1989) used non-physical depictions to simulate collisions between physical objects. Their simulations incorporated some constraints arising from physical laws, but intentionally left out constraints imposed by friction, which would obtain with any physical collisions. Gilden & Proffitt felt that these and other deviations from physical events did not compromise the "mapping" between their non-physical depictions and the perception of physical collisions, but more recent data suggest otherwise (Flynn, 1993; Runeson & Vedeler, 1993).

The above discussion raises two empirical questions that seem to me to be very important. 1) Do experimental participants pick up information specifying non-physical depictions as such? 2) If so, do their responses to non-physical depictions differ importantly from their responses to the related physical events? An extreme case would be an animated gun being fired at the point of observation versus a physical gun being fired at the point of observation. These two circumstances would yield different percepts, and different behaviors, in observers. Given this, we should not assume that presentation of "the same event" in non-physical displays is, in general, meaningfully equivalent to the corresponding physical event. Typically participants are well aware that they are being presented with non-physical displays. Attempts to conceal the identity of the depictions (for example, to hide the edges of a computer screen) are weak and almost certainly ineffective. In addition, our ability to simulate is still rather poor; at a minimum, image pixels or raster lines are visible (or, in the case of auditory depictions, there is a characteristic localization of sound at the speakers). Someday we will overcome these rather obvious "giveaways" but we may never reach the point where a perceiving and acting participant cannot distinguish a

non-physical depiction from its physical counterpart (the promises of virtual reality notwithstanding). Indeed, increasing the *fidelity* of a simulation (its resemblance -- subjective or analytical -- to that which is simulated) can cause or exacerbate problems, severely compromising the utility of the simulation (Riccio & Stoffregen, 1991).

Regardless of what the future holds, we are certain that most of our current simulations are perceived as such. We are studying the perception of non-physical depictions rather than the perception of physical events. What we do not know, and have too rarely asked, is whether participants' perception of the simulations as such materially affects their experimental responses. If it does, much of the research we have been conducting with non-physical depictions may not generalize to physical events. This point was made by Runeson (1974; though with what I consider to be the wrong terminology), but its general implications for the use of non-physical depictions have not been appreciated. Few of us would contend that our non-physical depictions are indistinguishable from the depicted physical events, yet we commonly treat them as though they were, ask participants to do likewise, and discuss the results as if they were the same (e.g., Andersen & Wuestefeld, 1993; Warren, et al. 1988). A particularly clear case of this is one in which participants were presented with an obvious non-physical depiction (which was characterized as apparent motion) but asked to respond to simulated (physical) events (Michaels, 1988). The resulting data were interpreted as evidence of the perception of an affordance that was not there to be perceived.

A general claim that a non-physical depiction adequately simulated physical events would seem to imply an empirical claim that participants would be unable to distinguish the non-physical depiction from the physical event. Indeed, the inability to distinguish the simulator from the simulated is a major goal for many designers of contemporary aircraft simulators (e.g., Hettinger, Birbaum, Kennedy, Dunlap, & Nolan, 1990, or the concept of *presence*). A similar question should be asked of cartoon viewers. Do viewers believe that the events in the cartoons have physical existence? Can they distinguish cartoons from the physical world? I submit that viewers of cartoons have no trouble with this. If viewers failed to appreciate that the events they were seeing were intrinsically non-physical they might find cartoons much less entertaining. Cartoon animators could go in the other direction by attempting to make their animations indistinguishable from the physical world (they could try to achieve presence), but then there would be no point in watching the cartoons (nobody wants to see a cartoon of what a physical coyote does to a physical roadrunner), and, hence, in making them.[1]

Observation versus perception-action

In large measure the use of non-physical depictions has seemed to be adequate because participants rarely do anything more than make judgments about such depictions. We do not ask them to act towards the depictions as if they were physical events. One obvious reason for this, so obvious that it doesn't seem important, is that they cannot. You can catch a ball, but you cannot catch a non-physical depiction on a CRT (cf. Michaels, 1988). Accordingly, non-physical depictions may be adequate for research on observation (perception without physical interaction, e.g., Cutting, 1987; Todd & Norman, 1991), but their adequacy in perception-action research is more problematic. I am not suggesting that non-physical depictions should never be used in perception-action research. I am suggesting that in many cases they will be inappropriate, and that at present we know less than is widely supposed about the conditions under which they are appropriate.

A more general way to state this is in terms of the following questions. 1) What actions of the participant would generate or reveal information for the non-physical depiction as such? 2) Does the participant execute these actions in the experiment? 3) If so, do they pick up the information that is revealed? And finally, 4) does any such picked-up information affect their responses in a way that bears on the purposes of the experiment (if no attempt is made to conceal the non-physical nature of the depiction only this last question is relevant). Ensuring adequate answers to these questions is a considerable burden, one that may grow as we engage the participant in more action-oriented experimental situations (this reflects known limitations in the use of *virtual reality* technology to simulate interactive physical events). Gibson argued that "the information for a certain dimension of perception or proprioception can be displayed without interference from the accompanying information to specify the display," (1979/1986, p. 305), but I am not

so sure. It seems to me that this is an empirical question.

The first of the above questions bears further comment. Information specifying a non-physical depiction as such will be made available by some actions but not others (cf. Mark, Balliet, Craver, Douglas, & Fox, 1990). Thus, we can reduce the availability of the relevant information by appropriately restricting the actions of the participants. The problem with this is that the restrictions necessary to "conceal" the non-physical nature of the depiction may severely compromise the ecological validity of our research, that is, the resemblance between what the participant perceives and does in the laboratory and what they perceive and do outside the laboratory. Enforcing observation and prohibiting physical interaction is the extreme form of this, but not the only one: to permit the use of "concealed" non-physical depictions in the laboratory we may have to impose (knowingly or otherwise) considerable changes on the action part of a perception-action task. The generalizability of such research would thus be an empirical issue that could not be settled solely through the use of non-physical depictions (contra Kaiser, et al., 1992). This is related to the issue of transfer of training between simulators and actual vehicles.

The third of the above questions is in part related to issues of conscious awareness. It is not easy to use conscious awareness to assess participants' pickup of information specifying the non-physical nature of a depiction (or the fact of any kind of simulation), for example by asking them whether the depiction "looks real". The statement "it looks real" implies knowledge that "it" is *not* real. Likewise, subjective reports of vection or egomotion in response to imposed optical flow (e.g., Andersen & Braunstein, 1985; Hettinger, et al., 1990) should not be taken as evidence that participants' experience was identical to that accompanying the simulated physical event, i.e., that they perceived themselves to be engaged in the physical event, or acted as though they were (cf. Stoffregen, 1990). This issue is prominent in the vection literature (Riccio, in press), but it is equally relevant to the use of conscious awareness to measure perception of any non-physical depiction or simulation. Of course, problems in the interpretation of subjective reports are not peculiar to the use of non-physical depictions.

Conclusion

In the end, I feel that *natural*, *real*, and similar words cannot be satisfactorily defined, or not in a way that is useful for students of perception-action. In addition, they carry too much value-based baggage to be used constructively. For these reasons I think these words should not be used.

Rather, we should be more precise in describing events, laboratory depictions, and so on. In particular, we should be precise in describing what it is that is specified by our laboratory depictions, and in characterizing relations between non-physical and physical events. Ultimately, I think that this will compel us to appreciate and deal with some fundamental limitations inherent in the use of non-physical depictions for the study of perception-action in the physical world.

[1]This is not true of some contemporary computer animations that are inserted into live-action films (e.g., morphing, or the digital dinosaurs of *Jurassic Park*) which are judged to be better to the extent that they appear to fit seamlessly into the live action, i.e., to the extent that they appear to be physical. The wonderment engendered by these animations cannot be taken as evidence that viewers believe the animated events to have physical existence, since viewers know before entering the theater that they do not.

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ABSTRACTS FROM 1993 N.A. FALL ISEP MEETING

An Ontology of Affordances: A Critical Consideration of Some Recent Proposals

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Certain ontological questions arise naturally from the ecological approach to visual perception, and they have been tackled with varying degrees of commitment. Gibson himself offered some tantalizing hints, and more recently some of the best-known writers in the field of ecological perceptual psychology have turned their pens to the issue.

Unfortunately, the tendency has been to think of ecological realism as being somehow to be founded on a materialist basis. This is unfortunate because it reinvigorates the very subject/object dichotomy that the ecological approach so brilliantly overcomes.

I shall argue that a much more promising approach takes affordances themselves as ontological primitives, instead of treating them as dispositional properties of more primitive things, events, surfaces, or substances. These latter are best treated as coalescences of affordances. On this view, even the ecological approach's stress on the complementary organism/environment pair is seen as expressing a particular affordance relation between the world and the philosophical analyst. That the world is parsed in any way among events and objects, perceivers and worlds, etc., reflects equally features of certain real or possible perspectives on the world and features of the world itself.

The motive for this critique is systemic generality. A fully general ontology must address an infinite array of quirky potential perspectives, centered sometimes on organisms and sometimes not. There are potential perspectives so small (for example) that what to human perspective is presented as surface or substance simply vanishes; such would be the case for a sub-atomic perspective. As important as human perspective is to our ontologies, ontology proper must seek a broader base. While the right approach -- the ecological approach -- is a full-fledged realism, it is not to be equated or even associated with either materialism or idealism. The ecological approach is precisely the abandonment of both of these semi-abstracted ontological points of view.

Haptic perception of limb orientation

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How does one haptically perceive the positions of one's limbs in space? Traditional answers to this question tend to rely upon innate mechanisms or prior experience. It is typically assumed for example, that the positions of a distal extremity can only be obtained from prior knowledge of limb lengths and joint angles. One proponent of such a theory was Lotze (1856/1885). As Lotze saw it, the brain receives via the nervous system an array of intensities, from which spatial properties must be derived. Familiarity with the dimensions of the limbs, obtained through repeated movements, and perhaps, cutaneous contact, allows for a "chain of ideas" resulting in an experience of the location of an extremity.

For J. J. Gibson, a distal extremity is perceived to be at a particular spatial location because there exists information specific to the limb's configuration. As used by Gibson (1979/1986), the term information refers to properties contained in structured energy arrays (ambient or nervous) that are lawfully generated by the spatial properties which give rise to them. Thus for an ecological approach, perception occurs on-line as a function of properties of the structured arrays themselves, rather than of attributes derived from the arrays. The quantification of such a structured array requires many independent quantities which act as a single unit. For a moving limb, the inertia tensor is such a structured intensity array. The inertia tensor quantifies an object's resistances to rotational acceleration. As a mechanical invariant specific to the three-dimensional spatial layout of an object's mass distribution, the inertia tensor can support the direct perception of the object's spatial properties (e.g., Solomon & Turvey, 1988).

For any object the eigenvectors of the inertia tensor are axes of rotational symmetry, they define the overall orientation of the object's mass distribution. By breaking the coincidence between the eigenvectors of the arm and its longitudinal axis, three experiments were reported which demonstrate that the perceived orientation of an occluded arm varied as a function of the limb's eigenvectors, rather than the angle of the limb at the joint. It was further discussed that, given that any movement of the body typically involves motions about several joints concurrently, there can be defined a separate inertia tensor at each point in joint space (the joints of the limbs and limb segments). The dispositions of the limb distal to each joint can be represented geometrically by the magnitudes and directions of the ellipsoid of inertia-determined by the eigenvalues and eigenvectors-at each joint. With the ellipsoid of inertia potentially being the definitive object structure for dynamic touch (see Pagano & Turvey,

1993), a field of such tensors may represent the contribution of dynamic touch to proprioception.

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Erratum

In the last newsletter, Volume 5, Number 3, in the article by James Jackson, "The perception involved in nonlinear strategic decision making: Comments on Richards (1990)," the key reference to the Richards article was dropped from the list in the transcription process. The omitted reference is:

Richards, D. (1990). Is strategic decision making chaotic? Behavioral Science, 35, 219 - 232.

Tassinary award

Last spring (dated 26 May, 1993), we received a press release from Texas A&M University about member, Lou Tassinary. Most of the text, written by Gretchen Krueger, follows:

College Station --- Dr. Louis G. Tassinary, an assistant professor of urban and regional planning in Texas A&M University's College of Architecture, has been named a 1993 Presidential Faculty Fellow by President Bill Clinton.

Tassinary, who also directs the college's Environmental Psychophysiology Laboratory, is one of the 30 university professors nationwide to receive the award.

The award acknowledges, rewards and supports young faculty members who demonstrate excellence and promise in science and engineering. Tassinary was nominated by Texas A&M for the program, which was initiated two years ago by President Bush.

Each award carries a grant from the National Science Foundation of $100,000 a year for five years.

"Dr. Tassinary's scientific research has set Texas A&M's College of Architecture apart from other schools of design," said Dr. Walter Wendler, dean of the College of Architecture. "His recognition through this award indicates that people are taking notice of the progressive interdisciplinary activity in the College of Architecture."

Nominees are judged on their competence and leadership as researchers and educators, implact on the nominating institution through cross - disciplinary research efforts, contributions to educational reforms and service to the institute and community on behalf of the institution.

Tassinary's major research area is the physiological impact of the environment on humans. As head of the Environmental Psychophysiology Laboratory, he measures and records human emotions elicited under simulated environmental conditions.

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