

RUNNING HEAD: Radically Embedded and Embodied

Toward a Radically Embodied, Embedded Social Psychology

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8/31/08

Abstract

A roadmap toward a more radically embodied social psychology is offered. The perspective embeds embodied minds in a niche: a physical and social environment with action possibilities (“affordances”) that humans are equipped to utilize. At the heart of this embedded perspective is the suggestion that the methods and conceptualizations of integrating the body into social psychology must be inherently more relational, approaching meaning as emerging from the relation of the individual to its environment, as instantiated in the affordance construct (Gibson, 1977; 1979). Moreover, a more radical embodiment also demands that scientists reexamine the environment, in a way that goes beyond the truism that the environment influences the individual, to understand how meaning’s emergence from individual-environment interactions obeys universal dynamical principles. In addition, the perspective illustrates that embedding an individual within an emergent social unit of action, a dyadic relationship or a group, provides new possibilities for perceiving and acting that both constrain and extend an individual’s way of interacting with the environment.

Toward a Radically Embodied, Embedded Social Psychology

This special issue on embodiment finds interested parties straddling two world views. On the one hand, the field recognizes the importance of *situated* cognitive processes (Semin & Smith, 2008; Semin, Smith, & Ziemke, 2002; Smith & Semin, 2004) implicitly sensing that our understanding of the world is somehow distributed across individuals rather than residing solely in one's own head (Hutchins, 1995), and that the body plays a significant role in our experience of the world (Barsalou, Niedenthal, Barbey, & Ruppert, 2003; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005). On the other hand, the field remains tethered to cognitive constructivist assumptions regarding causality (Richardson, Marsh, & Schmidt, in press). This old view of cognition as being about representation is incompatible with the embodied principle of "behavior before brain" (van Dijk, Kerkhofs, van Rooij, & Haselager, 2008): that thinking is *for* (in service of) action and that central nervous systems facilitate rather than direct behavior.

In order to fully develop an understanding of the embedded social perceiver we must move away from this cognitive constructionism. In the current paper we offer a roadmap for approaching this daunting task. Following the ecological perspective (Baron, 1980; Baron & Boudreau, 1987; Baron & Misovich, 1993; Gibson, 1979; McArthur & Baron, 1983; Newtonson, 1980, 1990), we offer a theoretical grounding for a more radically embodied-embedded account of social psychology (Marsh, Richardson, Baron, & Schmidt, 2006; Marsh, Richardson, & Schmidt, under review; Richardson, Marsh, & Schmidt, in press). The crucial aspect that we focus on in this paper is on the radical embedding of body in environment, and of individual in social niche. Two basic principles of this approach are (1) that it is in the relation of the organisms to its environment that meaning and causality lies, and (2) that emergence of ordered

behavior (new states of being, e.g., social units out of autonomous agents) comes about via self-organizing and dynamical principles.

Relational Meaning: Affordances

As mentioned above, this alternative, radically embodied perspective, that has been called a social synergistic approach (Marsh et al., 2006), has its roots in ecological (Gibson, 1979; McArthur & Baron, 1983; Michaels & Carello, 1981, Richardson, Shockley, Fajen, Riley, & Turvey, 2008) and dynamical systems perspectives (Kelso, 1995; Newtonson, 1993, 1998; Nowak & Vallacher, 1998; Smith & Thelen, 1994; Vallacher & Nowak, 1994; Vallacher, Read, & Nowak, 2002; Warren, 2006). For these related perspectives, being embodied and embedded is what allows us to *perceive* and it allows us to *move*. Our perceptions cannot be understood in isolation from our movements and the actions that in turn transform them. Moreover, these mindful processes (ones that may evoke thoughts and feelings) are grounded in an environment, as is illustrated by what, precisely, we perceive of the world. When taking in what is around us, we not only attend to animate and inanimate objects and surfaces, but we also perceive what possibilities a setting, an object, or an individual offer. These functional features of the environment, the meaning of them for a individual, are termed affordances (Gibson, 1979). Affordance is the best construct for challenging the irreducibility of our body to merely being an input system, albeit input with special status, to the cognitive system. In the 30 years since Gibson formulated this construct (Gibson, 1977), considerable research has verified the fundamental predictions of affordance theory for a wide range of solo behaviors.

Most research on interpersonal detection of affordances since McArthur and Baron's (1983) influential paper that introduced affordances to social psychologists has focused on the accuracy of detecting features of another individual that have implications for our interactions

with them (see Marsh et al., 2006, for a review). A more relational approach, however, is to examine how the presence of another provides new possibilities for action.

Recent research on embodied cooperation uses a plank-moving paradigm reminiscent of Asch's example (1952, p. 173-174) of the cooperative action of two boys moving an obstacle. Asch described a dynamic process involving mutual, immediate responsiveness to each other, reflecting a "unity of action that embraces the participants and the common object." In the embodied cooperation research, the task required participants to move planks of various lengths by touching only the ends. Three key predictions of affordance theory (Michaels & Carello; Richardson et al., 2008) were tested. First, information veridically specifies affordances, and second, perceivers are sensitive to this information as evidenced by their perceptual judgments and their actions. Third, enactments of those perceptions (e.g., whether we can carry a long plank alone rather than requiring cooperative action) should be rather precisely predicted by a relational measure (a "body-scaled ratio") that captures features of the environment (e.g., length of a plank to be carried) *taken with respect* to attributes of the person (e.g., one's arm span). Our research demonstrated that the shifts from action modes (solo and cooperative action) were predicted by a body-scaled ratio, and that the same patterns of behavior demonstrated in shifts in behavior modes for solo action (e.g., picking up small planks with one hand or two) were replicated in the emergence of cooperative action, shifting between moving planks individually and jointly moving them with a partner (Isenhower, Richardson, Baron, Carello, & Marsh, under review; Richardson, Marsh, & Baron, 2007).

Affordances are a major conceptual vehicle for understanding how meaning is embedded in the world, and a key underlying relational construct to a radically embedded perspective. It is critical to remember that an affordance is not a construction by the individual, not an imposed

abstraction, a developed schema learned because of repeated experience with objects that have met a given need in the past. Rather affordances *exist* in the relationship of the actor and the environment and can be detected and enacted by creatures with the right body and history—they have a reality that exists at the relation of our fit to our world, it is not a cognitive construction imposed on instances of things in the world. Affordances are inherently relational in nature, can only be assessed by the intersection of the person's fit to the environment.

As the plank-moving studies illustrate, affordances are different for every kind of perception-action system, whether that is a system of an individual completing a task with only their body, or an individual completing a task with tools, or pairs of individuals completing a task. Research on tool use in solo action offers an important demonstration of the consequences of embedding for the individual. When we take up a tool, for instance, it becomes a part of our perception-action system, extending our body's boundaries and allowing us to capitalize on other affordances of our environment (Hirose & Ziemke, 2002). If we reach out with a stick to probe the wall, we “feel” the wall not at the juncture of our hand and the stick, but strangely, we are able to “feel” the wall's location at the end of the stick as if it were a more permanent part of our body. So too is wearing an item of clothing an act of embodying, where the item becomes a part of us, and, once attuned to any unfamiliar features (e.g., high blocks attached to shoes, Hirose & Nishio, 2001), we can accurately perceive what environmental affordances will be enactable (e.g., ability to step over a bar that previously would have been too high).

In the social arena, tool use might also be an important way for socially embedded individuals to extend their action possibilities and create new affordance possibilities for *social* interaction. Recent social psychological theorizing (Daniels, under review) uses an ecological approach to analyze how individuals use clothing as tools to extend their possibilities for social

action (e.g., to better convey information about features relevant to gender and fecundity, in attracting a mate) as well as solo action (e.g., using a pot holder to extend graspability to hot objects, sunglasses to extend our ability to function outdoors). New research paradigms in this area extend past research on how visual information veridically specifies features crucial to social interaction such as sex (Runeson & Frykholm, 1983), identity (Richardson & Johnston, 2005) and muggability (Gunns, Johnston, & Hudson, 2002) to examining the specification of attributes of individuals (e.g., sex) by auditory information, and the amplification of such information through tool use (e.g., wearing high-heeled shoes; Daniels & Marsh, 2006)

We hypothesize that becoming a temporary unit of social action with another person also involves creation of a new perception-action system with new capabilities. The individual becomes embedded in a social unit, with a reality of its own. By engaging in joint perception or joint action with another (Clark, 1996; Gilbert, 1996), our actions serve to impact and define the social unit of which we are a part, and in turn our actions are constrained and channeled by participation in this relationship or group.

Relevant research indicates that certain region of neurons fire not only when perceivers acts but when they see (or hear) another individual enact the same meaningful action as well (Gallese, Keysers, & Rizzolatti, 2004; Rizzolatti & Craighero, 2006). Moreover, joint action research indicates that when two individuals sit side by side viewing a display, and each has an individual task—to press a key, for instance, based on certain features of a hand on a screen—the speed of one individual's response is affected by features that are irrelevant to their own task but relevant to the other person's (Sebanz, Bekkering, & Knoblich, 2006; Sebanz, Knoblich, & Prinz, 2005). In our own joint action research, pairs of individuals who are asked to do a simple rhythmic task such as rock in a rocking chair are mutually influenced by each other: they are

pulled to spontaneously synchronize their movements (Richardson et al., 2005, 2007; Schmidt & Richardson, 2008). Importantly, the patterns of behavior that occur between two individuals, rocking independently in separate chairs—with no mechanical linkages, only informational links—obey the same universal dynamics as coupled components (arms) within a single body. That some kind of coherent unit is created is also suggested by the fact that manipulations that increase synchrony also increase feelings of team-ness (Marsh et al., under review).

Research underway uses vision or audition to affect synchrony (1) examining in-group out-group processes that result and (2) objectively quantifying group entitativity. Well-established effects of noise, attractor strength, and mismatched frequencies on synchrony (Schmidt & Richardson, 2008) could also be used to understand/undercut implicit prejudice. Finally, synchronizing may provide a “mooring effect”, freeing cognitive resources, increasing perceptual fluency, and improving memory or performance (Macrae, Duffy, Miles, & Lawrence, in press; Marsh et al., under review).

Dynamics: Emergence of Meaning

Thus far we have suggested that radical embedding means focusing not just on the body or environment as creating input for the cognitive system, but examining a body's actions as an object of study in itself, particularly with regard to the enactment of affordances. The challenge then, is to understand how meaning emerges and is enacted via means other than cognitive stimulation and constructive processes. As social psychologists, we already know of course that people are connected, that they influence each other, and that they are products of the social environment (e.g., Asch, 1955; Middlemist, Knowles, & Matter, 1976; Shattuck, 1980) . But our meaning here is something substantially beyond linear causal influence, rather it is about the

manner by which things come into being. The “how”, as it turns out, matters substantially to our account: the dynamics matter.

When we see incredibly complex behavior that reflects some relationship, some coordination among elements, we normally assume that some plan is behind it—either a plan that is hard-wired into us at birth, or a plan that the constituents have learned through extensive training, like a group of synchronized swimmers or aeronautic daredevils learning their performance. We also think that getting something from outside of the individual to be translated into their own actions requires mediation by the cognitive system: an internal simulation of what is occurring outside of us with an implied prediction as to what will happen next. These two different issues—use of a plan to explain complex, coordinated behavior, and the internal simulation of the outside world inside our head—can both be eliminated by truly embedding the individual within a temporal sequence of events as well as an environmental context. Termites build quite complex structures, engaging in behavior that seems purposive; their work seems to imply following a master plan. But embed the termite in an environment that is subject to certain laws of physics (how chemicals diffuse in air), and posit for the termite only simple motivational principles—a tendency to be pulled toward or pushed away from some important stimuli in the world—then a complex termite structure emerges with no plan required (Kugler & Turvey, 1987).

The challenge to the normal way of thinking is to take rather seriously that causality resides at the level of the interaction, rather than in our head. The only way to understand how meaning emerges at the intersection, is to realize what the implications are for being embedded. Embedding means two things in this context: interconnectivity or correlation, and as a

consequence, participation in a larger unit of which our actions are a part and which in turn constrains actions.

First, by interconnectivity, we mean that the components must have a dependency on what is around the component (what neighbors an individual has) and what the past trajectory was, the history of how the component got to the current state. There must be coupling of components in a system, but it is a loose coupling rather than a rigid mechanistic relation. Pulling one element pulls at other elements much as pull on one string in a mesh of interwoven strings can be felt in other parts of the cloth. Through interconnectivity, we are pulled along, (and sometimes repelled) by those that are in some way “nearby” (Nowak, Szamrej, & Latané, 1990, Nowak, Vallacher, & Zochowski, 2005). Intercorrelations between individuals may exist because of past positive (or negative) relational linkages, chronic proximity, or even by the mere presence of those only temporarily present, as mimicry and synchrony research illustrates (Chartrand & Jefferis, 2003; Dijksterhuis & Bargh, 2001).

Second, the overarching structure that comes into being as a result of mutual pulls toward such structure (group, family, relationships, or even just those who are temporarily present and engaging in shared perception of the world), constrains the behavior of the constituents that compose the unit. That is, there should be some resistance of the larger unit to change, with perturbations away from balance being dampened by the restraining structure. Only with sufficient inflow of energy can the structure be broken or changed into a new group, relationship, or organization. As creatures subject to the same evolutionary forces as other creatures, it is important to realize that the same principles of self-assembly of complex structures, and organic emergence of form, impinge on us as social creatures. Thus the rich literature on dynamics of self-organization provides considerable tools for understanding social psychological phenomena,

not just the dynamics of cognition (Nowak & Vallacher, 1998; Vallacher & Nowak, 1994, 1997) but the relatively neglected dynamics of behavior as well (Kelso, 1995; Turvey, 1990; Richardson, Marsh, Isenhower, Goodman, & Schmidt, 2007; Richardson, Marsh, & Schmidt, 2005). As a result of participation in that synergy, individuals not only both share in the definition and creation of the social unit, but also are constrained and completed by it.

With the emergence of a new structure, a “mob” out of a group of individuals on the street, or a temporary social unit of two people in conversation, a complex system composed of huge numbers of variables and high degree of complexity becomes reduced to a simpler state described by fewer variables. Two individuals not engaged as a temporary social unit in conversation are not bounded/constrained in the same way as two people who are speaking face-to-face. A certain physical distance is maintained, verbalizations and nonverbal gestures of two people that are mutually interdependent with the verbalizations and gestures by the other and that preceded and are co-occurring with it. Research demonstrates that postural sway and breathing individuals in conversation with each other are mutually constrained by one another (Shockley, Baker, Richardson, & Fowler, 2007; Shockley, Santana, & Fowler, 2003; Warner, 1996) and there is convergence between individuals’ gestures and even accents (for a review, see Giles, Coupland, & Coupland, 1991). A more intimate committed relationship provides a summary state that “reduces down” the complexity of prediction of all the actions of one individual and another individual. Long-lasting quantities (the relationship) enslave shorter-lasting ones (temporary interactions with others). Merely being a member of a highly cohesive group exerts pressures on the individual members to maintain group consensus. The social reality shared by a group creates pressures on the individual members to maintain that reality. For most social-level phenomena, the coupling of movements and of cognitions among individuals who are parts of

the unity is relatively “loose” rather than rigid, but with the felt force of social-level units on individuals that are nested within those units being no less real. At the social level, in contrast to emergence of collective structures that emerge at the physical level alone, the bindings (as far as we know so far) are almost entirely *informational* rather than mechanical bonds or chemical ones.

With the emergence of a new entity such as a pair or a group—a new simplified structuring of patterns in the physical or social world—comes new properties of the entity. Groups have possibilities for action that are something different from that of the possibilities of all the individual members that comprise them. A rugby team can engage in actions that are impossible for an individual alone.

What evidence, however, is there that dynamical principles underlie the emergence of social behavior? In our own research, we have considerable evidence that dynamical principles underlie the switching between behavior modes that in some way reflect states of autonomous action and coordinated action. For instance, people’s intentional as well as spontaneous synchrony in rocking behavior (and other rhythmic behavior) displays exactly the kind of patterns that dynamical models of emergent states predict, and obey other features of dynamical systems (Turvey, 1990) as well (see Schmidt & Richardson, 2008). In our research on embodied processes of cooperation (Richardson et al., 2007), the nature of the shifts between solo and joint action demonstrate that the system has the key dynamical feature of multistability. That is, there are certain values of the plank-to-armspan measure at which both solo and joint action are stable states, and for which the immediate sequence history determines which state the system is in (termed “hysteresis”).

Radical Embodiment as a Roadmap for Social Psychology

Our suggestion for social psychology's future is that we move closer to a more radical yet holistic understanding of the body's participation in the creating of meaning. In particular, this requires stripping away the notion that it is merely the cognitive system that imposes meaning and value on things in our world. In addition to being born with bodies that provide a foundation to mind and meaning, bodies are born into environments and the evolving relations between organisms and their environments provide an additional embedded context of meaningfulness. More specifically, we suggest that a more radically embodied, *embedded* social psychological perspective would involve several changes. The most important of our suggestions for an embedded social psychology is to take a 'new look' at the *environment*. This we see as the most neglected aspect of current directions in embodiment: understanding body-based phenomena in relation to the environment. Before we detail this, however, we first make three interrelated, preliminary comments about how action and body should be studied from a more embedded perspective.

First, it would be worthwhile for the field to develop more of an interest in studying "doing", as others have also argued (Baumeister, Vohs, & Funder, 2007). By this we mean having a general interest in the processes of behavior, or activity, as ends in and of themselves. Social psychology currently studies individual-level behavior rather than viewing body-based activity as inherently relational. From the traditional perspective, behavior may be a signal, or a display, or an emission that marks an internal state of an individual, often in order to communicate that state to others and to influence others' states in turn, or it may be a mere consequence of that internal state (an intention). But this is substantially different from studying behaviors that are more functional, more integral to the relation between person and person or between person and environment, that is, finding a way to measure and quantify behavior that

captures something at the level of the relation. Fortunately, substantial research from the ecological perception and behavioral dynamics literatures offers ways to quantify relational variables. For instance, how much one individual emits some behavior and another individual mimics the behavior can be quantified in terms of each individual's frequency of emitting the behavior, but what can also be quantified is the state of synchrony of the system (or groupness or connectedness), assessing one individual's state *relative to* the other's, using dynamic measurement and analytic methodologies (Shockley et al., 2003; Schmidt, Carello, & Turvey, 1990). We should also study behavior for solo actors in a way that is more attuned to the person-environment relations (i.e., affordances). Of crucial importance, again, is that the body be studied in a more functional way—in terms of what it is used for, in terms of its relation to the environment (Lopresti-Goodman, Kallen, Richardson, Marsh, & Johnston, under review) or relation to others (Gunns et al., 2002)

Second, researchers should ideally study how behavior unfolds in time. The dynamics of behavior unfolding over time, not merely the outcomes of behavior, are important to study. One reason for studying the body's actions in terms of dynamics is that it uniquely allows for examination of emergent phenomena that are a result of the relatedness/embeddedness of persons and persons within an environment. Illustrative of such techniques are analytic techniques that examine how informational linkages between individuals lead individuals to unconsciously attend and respond to their movement (Richardson et al., 2005). Even incidental movement (rocking in rocking chairs) can be the basis for the coupling of two or more individuals into a coordinated social unit (Richardson et al., 2007). This tendency to be pulled into the orbit of another's movements may well be a rather rudimentary basis for the formation of some social units of being.

More concretely, we suggest a bit of a methodological paradigm shift in researchers' methods. When using degree of synchronous state as a dependent or independent variable, researchers can use rhythmic techniques (swinging a pendulum, rocking in rocking chairs, respiration) and motion sensors to continually track how much coordination emerges. For more complex tasks (e.g., communicating in a problem solving task) degree of coordination in nonrhythmic motion can be assessed (e.g., force plate to assess postural sways). If collaboration with colleagues who have such tools is impossible, other techniques for coding dynamic behavior are available (Bernieri, Reznick, & Rosenthal, 1988; LaFrance & Ickes, 1981), but it may be extremely onerous to code these in a way that preserves the dynamics (Newtson, 1994). Whatever method is used, however, use of dynamic measurement may offer clues for psychological states of connection and disconnection.

A third suggestion is for an increased focus on joint participation in physical (goal-directed) action. For example, much of what we know about phenomena such as cooperation is from studying strategic decisions, using game-playing type methodologies (e.g., Prisoner's Dilemma). Such cooperation is rather different in nature than Asch's (1952) rich example of two boys moving an obstacle, in which emerges "a unity of action that embraces the participants and the common object. The performance is a new product, strictly unlike the sum of their separate exertions" (pp. 173-174). There would be merit in examining more extensively joint participation in physical action, cooperating or competing on a task as the basis of forming more lasting social units. Not all groups, relationships, or other kinds of social units are created top-down. Some marriages are arranged, and some study groups are intentionally formed to work on a problem. But most of the day-to-day temporary connection with another in short interactions, still have a reality as a real unit, albeit temporarily. Someone touches us on the shoulder, calls our name, or a

passing stranger glances at us, and this is a catalyst, a rapid switching mechanism (Iberall & Soodak, 1987) for switching from an autonomous individual mode of action to being pulled temporarily into a "social eddy" with another, a dynamic patterning, a dance that includes rich nonverbal (and perhaps verbal) behavior, responsivity, mutuality, and coordination of behavior. These social interactions are so brief and spontaneous that we take little note of them, but we may carry their impact with us—they may make us feel attractive, important, stupid, uninteresting, threatened or safe. Studying situations in which the goals or the environmental constraints lead individuals to engage in some cooperative or competitive physical movements is relatively neglected.

Our final suggestion is that serious study should be given to the environmental context that evokes and participates in the creation of meaning. A radical reconsideration of our active bodies as being embedded in a context means paying more serious attention to the environment—an environment filled with possibilities for action. Earlier research in behavior settings, environmental psychology, and urban planning could be informative in our future tasks, if we take a new look at those areas with an eye to a more affordance-based approach to these environments. Early research examined the richness of the environments that children inhabit (e.g., Barker & Schoggen, 1973; Heft, 2001), but surely adult environments are no less rich.

More specifically, we suggest that researchers examine the behavior of individuals in natural settings (Whyte, 1980), vary features of environments to provide different affordances for behavior and see first, whether people attend to these features. Individuals' judgments, emotions, and the psychological pull toward (or repulsion from) such settings should differ depending on the information provided in them for what can be done with others in them. Second, we should see whether people who are put into such settings engage in different actions,

consistent with the predictions of ecological theory. We can examine how people create and change their environments (Heft, 2007) to make them better fit their actions, and how people naturally reorganize their relation to their environment and whether the psychological states that are predicted to reflect success (better order) and failure (disorder) fit with theory (Järvillehto, 1998). Researchers can create mild conditions for connection versus disconnection, for solo versus cooperative action either by setting the initial conditions through selection of participants that differ in dispositions, or by choice of environments with different initial conditions (e.g., a situation that imposes sitting with strangers rather than claiming a solo table) and test whether the environmental features, or the fit of participant abilities to the environmental possibilities determines what behavior results. In general, researchers can examine how the possibilities for behavior are changed (enhanced and limited) when one versus multiple persons are present in a given setting. We suggest that researchers analyze the functional features of different environments and what behaviors occur in them, as earlier environmental psychology researchers have done, but with more ecological theory-driven motives. Analogous research analyzing the affordances of children's environments can serve as a guide for analysis of adult social behavioral settings (Heft, 1988; Heft & Chawla, 2006).

In our search for a roadmap that is both embodied and embedded, we seek a root metaphor (Pepper, 1970) that differs substantially from the metaphors that currently underlie social psychology. It must first be compatible with a view of cognition as primarily useful in “directing traffic”, or helping to “sustain the necessary conditions” that allow effective body-world interactions to unfold (van Dijk et al., 2008, p. 309). It must also be a metaphor that is organic and generative about the role of the body, and more apt for an organism that has evolved systems to sense and move in a world, and as a result able to create and participate in meaning

that lies in the relation of that creature to that world. Perhaps helpful is the concept of a “chimera” borrowed from biology (Rosen, 2000) for conceptualizing an organism that has an implausible wholeness, despite the disparateness of the parts that compose it. We see the emergence of a social unit as a wonderfully curious and yet non-mythical chimera, something that has an utter sense of coherence, a feeling of rightness in its existence, despite the diversity of the individuals that bring it into being.

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We thank Harry Heft and Lynden Miles for comments on earlier versions of this manuscript.

Preparation of this manuscript was supported by a grant from the National Science Foundation to Kerry L. Marsh, Reuben M. Baron, Claudia Carello, and Michael J. Richardson.

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