

The Metaphor of the Triangle in Theories of Human Development

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Abstract

Developmental psychologists have a long history of using triangle metaphors to conceptualise the social constitution of psychological development. In this paper, we present a genealogy of triadic theories, to clarify their origins, distinctions between them, and to identify key themes for theoretical development. The analysis identifies three core triangle models in the developmental literature. Each theory relies on some combination of the terms subject, object, other and sign, and they can be distinguished by the core psychological dynamic which they entail. We distinguish an emotional triangle rooted in psycho-analysis, a mediational triangle rooted in the work of Vygotsky, and a sociocognitive triangle originating with Piaget. Despite their differences, the analysis reveals a common theme of the transformation from external mediation to internal mediation. Contemporary research and possible future directions are discussed in the light of the theoretical distinctions that our genealogy has revealed.

The triangle is one of the most persistent metaphors in developmental, cultural, and social psychology. This peculiarly geometric metaphor has been used to articulate the relationship of a subject with another person and the world [e.g., Fonagy, Gergely, Jurist, & Target, 2002], the relationship between three persons [Fivaz-Depeursinge & Corboz-Warnery, 2001] and the relationship between a person, ideas, and concrete objects [Carpendale & Müller, 2004]. Despite their prevalence, the uses of triangle metaphors have received little interrogation by their advocates. In this

paper, we critically examine the history and utility of triangle metaphors in developmental psychology.

The metaphors which we use in science are not mere communicative tools facilitating the communication of complex ideas. Rather, they are constitutive of those ideas [Leary, 1990; Lakoff & Johnson, 1999]. Complex ideas, including scientific theories, are not 'mirrors of nature' [Rorty, 1979], but semiotic artefacts which mediate researchers' relation to a given object of study. In other words, theories are part of the researcher's apparatus or tool kit [Mead, 1936, p. 351]. Metaphors and theories, just like tools and instruments, connect researchers to nature and enable them to act upon nature. In everyday life, before using a tool, we need to consider the purpose for which it has been designed, and its suitability to our goals. Similarly, it is expected from researchers that they reflectively question the semiotic tools that they use in their theories, which make visible certain phenomena while occluding others, and which construct their reality and guide their actions.

This paper presents a critical genealogy of the triangle as a metaphor in developmental psychology. It does so with the two following aims. Firstly, it has the historical aim of clarifying the origins of contemporary triadic models, as well as their differences and similarities. Secondly, it has a theoretical aim of extracting from the variety of triadic theories key themes for a productive theory of the role of the social in constituting psychological development.

A Metaphor for the Social Development of Mind

If a metaphor is a semiotic tool, what is it that we want to better understand or theorise with the metaphor of the triangle? In this paper, we deal with triadic models which have been invoked to model psychological development through interaction between person and world. Such models claim that development entails three irreducible elements – which are placed at the corners of a triangle, usually comprising a subset of the elements subject, object, other, and sign – and theorise the relationships between these elements, represented as the sides of the triangle. Whereas binary models of the person-world relation construe the relationship as a direct one, triadic models emphasise that something or someone *mediates* an agent's action or understanding. We know that children need social interaction for normal development, but triadic models (and this paper) ask: through what processes is social interaction turned into human development? Or more precisely, how does the child, who is initially regulated by his/her parents, come to regulate his/her own actions?

Thus, triangles are used to model the social basis of human cognition and the relation between interpersonal and intrapersonal developmental processes [e.g. Chapman, 1991; Danis, Bernard, & Leproux, 2000; Striano & Rochat, 1999]. These models are associated with a variety of conceptualisations of the relation between social interactions and psychological development, such as: internalisation [Vygotsky, 1978; Valsiner, 2001], interiorisation [Klein, 1975; Piaget, 1974], equilibration [Piaget, 1974], appropriation [Rogoff, 2003], sociocognitive conflict [Mugny, Perret-Clermont & Doise, 1981; Perret-Clermont, 1980], mentalisation [Fonagy et al., 2002], or symbolisation [Freud, 1900/2001a]. Our purpose here is not to review or evaluate this particular set of theories, as has been done elsewhere [Lawrence & Valsiner,

1993, 2003; Tudge, 1997; Valsiner, 1997], but to focus on the various uses of the triangle metaphor to support such theoretical investigations.

The theoretical focus of the paper on the social constitution of psychological development, then, sets the criteria for which three-part models are to be included in our analysis, and which are to be excluded. Three criteria were chosen:

(1) given that the focus is on psychological development, at least one element of the triangle should be a subject, a person who might develop;

(2) for the model to represent an integrative theory, there should be explicit statements about the mutually dependent relationships between the elements of the triangle; this excludes triangles which are simply lists of three elements;

(3) for the model to represent development, the triangle should not be static but should express change.

These criteria led us to exclude some triadic models which are often quoted in psychology, such as Peirce's [1998]. Peirce's project was to understand processes of logic and signification. The structure of Peirce's triangle is that objects mediate between signs and interpretants; Peirce's primary concern with this triad was in its logical structure, and he found widespread evidence for this logical-semiotic structure:

In this sense, a word represents a thing to the conception in the mind of the hearer, a portrait represents the person for whom it is intended to the conception of recognition, a weathercock represents the direction of the wind to the conception of him who understands it, a barrister represents his client to the judge and jury whom he influences. [Peirce, 1868, section 9]

Peirce's triad is 'developmental' in the sense that the three elements can evolve: an interpretant can become an object for a subsequent sign and interpretant. But his theory is not a theory of human development. It does not deal with the development of psychological processes, and for this reason, it is excluded from the present analysis.

Restricting our focus to triangles which are explicitly used to conceptualise human development, our analysis has produced three core triangle metaphors. There is an emotional triangle originating with Freud, a mediational triangle initiated by Vygotsky, and a sociocognitive triangle rooted in the work of Piaget. Interestingly, as we shall demonstrate, in order to model development, each of these traditions put forward not one, but two triangles. We now turn to presenting these three core triangle metaphors. We will discuss each in turn, before comparing, contrasting, and evaluating them. Finally, we will indicate possible directions for future theorisation.

Three Families of Triangles

Our genealogy of triangles must begin with the dissatisfaction of many theorists with dyadic models. The classic dyadic model is the behaviourist stimulus-response model, in which learning is an accumulation of associations between stimuli in the world and the organism's responses. Critiques of the behaviourist model have often preserved the person-world dyad as their basic unit. Dewey's [1896] concept of the act, for instance, focuses upon the individual's relation to the physical

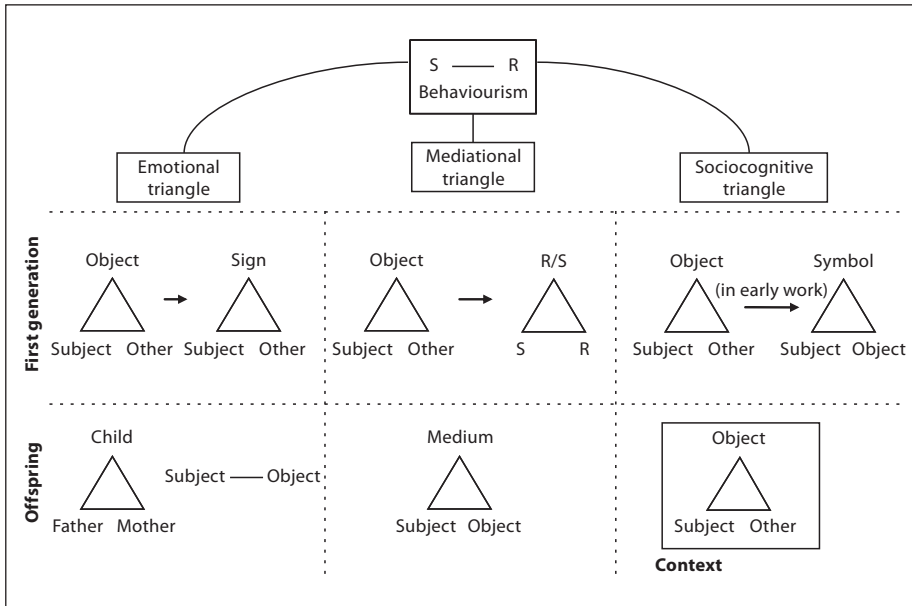


Fig. 1. Genealogy of triangles.

world, giving little attention to social interaction [Gillespie, 2005]. For others, the dissatisfaction with dyadic models was associated with a search for a more social theory of human development, in which the social and symbolic had a role to play. We suggest that this move from dyadic to triadic models is a paradigm shift, in a Kuhnian sense.

We have identified three sets of developmental triangles, located in different eras, countries, and scientific communities, which generated three relatively independent traditions of research. Figure 1 presents a genealogical tree, distinguishing the three traditions. In the first one, an 'emotional' pair of triangles addresses the emergence of the sign as enabling thinking. This was put forward by Freud, and subsequently developed by various schools of psycho-analysis. In the second branch, a 'mediational' pair of triangles addresses the cultural mediation of thinking. It was inaugurated by Vygotsky, and has since been developed and refined by sociocultural psychology. The third branch, illustrating the 'sociocognitive' tradition, pursues Piaget's intuitions about the role of others as mediating the development of humans' knowledge, and has been explored by social psychologists of development.

In this section, we explore each branch of our genealogical tree in turn. We first describe the theoretical specificity of the first generation of triangles of each branch. We then sum up each triangle on four dimensions: (1) the triangle's theoretical purposes and the questions it addresses; (2) the triangle's corners (the elements comprising the triangle); (3) the nature of its sides (the relation between the elements), and (4) the developmental theory which it represents. We then examine the more recent offspring of the initial triangles.

The Emotional Tradition

In psycho-analytic triangular models, emotions are the driving force. Working with patients engaged in distorted forms of thinking, emotionally overwhelmed, or apparently deprived of affect, psycho-analysts try to account for the possibility of representational and verbal thinking. The question which is addressed by Freud and other psycho-analysts working with adults is: how is thinking possible at all? Reconstructing adults' past on the basis of their present discourse and conduct, as well as observing infants interacting with their mother, they thus ask: how did thinking emerge in the first place?

First Generation

In 'The interpretation of dreams' [1900/2001a], Sigmund Freud sets himself the task of accounting for the mental life that exists in dreams and thus starts building a model of the psychic apparatus. In chapter 7, Freud proposes an ontogenetic explanation for the emergence of thinking through signs, starting with a model of mind as a reflex apparatus – a stimulus-response structure. At a certain point, internal needs appear in the organism of the infant, causing an internal modification (e.g., the experience of hunger). To account for the fact that the hunger is perceived, one must postulate the existence of some intermediary between stimulus and response. Because of this internal modification, or need, the infant will be looking for satisfaction: he/she will make a noise or enter into a state of agitation. The mother, then, provides the child with some food (e.g., milk) which satisfies the need. The infant can now retain a perception of the satisfying object thus provided, and thus a mnesic trace of the object is united with the mnesic trace of the satisfaction of the need. Because of this mnesic trace, the need will now appear to the infant as a wish (for a certain satisfaction). The wish could be satisfied through the memory of the previous satisfaction, which would create a hallucinatory satisfaction (the real need, the hunger, is not satisfied by a memory of food). In contrast, the mother could acknowledge the need, and provide the child with an object to satisfy it. The real food would thus be united with the hallucinated food, the wish and the need would be satisfied at once. A sign is born here, at the meeting of wish and reality, thanks to the acknowledgement of the mother. Freud has replaced a binary reflex apparatus with a psychic apparatus, that is, thinking mediated by signs.

Yet the logic of direct satisfaction, characteristic of the reflex apparatus, does not disappear. Rather, two types of thinking processes will coexist. Freud distinguishes primary from secondary processes. *Primary processes* are mental associations that are fluid and direct, quick, avoiding displeasure and looking for immediate satisfaction. They suppose a mind like a reflex apparatus, without delay or transformation of signs. In contrast, *secondary processes* are the unique product of a psychic apparatus that can hold experience in signs, delay and transform displeasure, or create complex causal chains.

We can now clarify the nature of this first emotional triangle, on the basis of our four dimensions. (1) This triangle examines how humans are able to reflect upon their emotions and experiences, and to delay the satisfaction of their needs. The key to this question is the process of symbolic elaboration (turning experiences into signs), and thus the question becomes: how does symbolisation emerge? (2) The cor-

ners of the triangle are the *subject* (the child), an *other* (the mother), and an *object* by which the mother satisfies the need she recognises in her child. (3) The sides of the triangle represent emotional and representational relationships. The mother recognises and feels the needs of the child, and the object satisfies them; but as it becomes a sign, it *represents* these experiences. (4) The developmental theory here is that symbolic thinking develops through interaction with a caregiver and a desired object. Development is expressed by a transformation of the first triangle into a second one. There is first a *subject-other-object* triangle, in which *subject* wants *object*. *Other* then replaces the *object* with a name or a *sign*, and the child *subject* learns to use the *sign* to act on the *other* to cause her to provide the *object*. There is thus a second triangle, a *subject-other-sign* triangle (see left-hand branch of the genealogical tree, fig. 1). Finally, the *subject* is able to regulate himself/herself thanks to *signs*, in a *subject-sign-subject* triangle. This last process, from *subject-sign-other* to *subject-sign-subject* can also represent the development of adults' self-understanding in the psycho-analytical setting. As André Green [2000, 2002] describes it, the *subject* addresses a discourse to *other*, who in turn replies with interpretations (*signs*), thanks to which *subjects* can make sense of their own experience, coming to reflect on that experience, and to regulate it.

Offspring

Psycho-analysts have emphasised another emotional triangle present in Freud's work: the *father-mother-child* triangle [Freud, 1905/2001b]. It is often referred to as the 'oedipal configuration.' This triangle is often understood as expressing a fundamental anthropological distinction structuring human life: the difference between sexes (*father-mother*) and the difference between generations (*father-child, mother-child*). For some authors, the oedipal triangle is foundational to the emergence of language and sign: the father imposes the verb, which separates the previously fused mother and child [Lacan, 1966]. Such ideas have led to research on the basic family triad [Corboz-Warnery & Fivaz-Depeursinge, 1999; Kerig, 1995; Stern, 1985]. However, if we ask the developmental question of how symbolic thinking emerges, the family triad, in fact, must return to the *subject-other-sign* triangle. The mother (*other*) is absent to the child (*subject*) in so far as she thinks about the father (*sign*). The child (*subject*), trying to reach the absent-minded mother (*other*), has then to think (*sign*) [Green, 2000].

On the other hand, the object relations school of psycho-analysis has departed from the triangular metaphor, and can be characterised as giving a dyadic (*subject-object*) reading of Freud [Green, 2000, 2002]. In Melanie Klein's [1975] theorisation of the psychic life of the infant, the infant is seen as having basic feelings or drives directed towards some 'objects' of investment (cathexis). Given the dependency of the infant, the first and major object of investment is the 'breast,' the fantasmic apprehension of the caregiver as satisfying or frustrating basic needs. By extension, the mother, and then every other that plays a role in a person's emotional life, is called an 'object.' The relation between *subject* and *object* is an emotional relationship, working through binary mechanisms such as projection and introjection. Note that 'object' here designates what we usually call *other*. The focus of attention is on this relationship between two people, one being called *object*; there is no reference to an object or reality external to that relationship. There is thus no space for mediation in such a theory of thinking.

Similarly, attachment theory, initially a triadic model – the relationship developing between child and caregiver is mediated by some emerging mental model in the child [Bowlby, 1969], which can be reported on other relationships – is often reduced to a binary model – a given relationship is of this or that type [e.g., Hazan & Shaver, 1987, 1990]. The reduction of a triad to a dyad also suppresses the potential dynamics of the model, such as the co-evolution of attachment interactions and mental models.

Interestingly, a recent stream of research has reintroduced the initial psycho-analytical theory of symbolisation, supported by current work on the ‘theory of mind.’ Fonagy and his colleagues show the importance of the mother’s reflective functioning, that is, her capacity to think about her thinking and about her child as a thinking person, in the constitution of the child’s ability to symbolise [Fonagy, 1999; Fonagy et al., 2002]. As Fonagy [2000] writes, this model of the birth of the psychological self can be seen as a variation on the Cartesian *cogito*: ‘My caregiver thinks of me as thinking and therefore I exist as a thinker.’ Thus, the relationship between mother, infant, and mother’s verbal or non-verbal recognition of the child’s emotional state, a *subject-other-sign* triad, becomes an internalised, *subject-sign-subject* triad when the child is able to self-regulate.

The Mediation Tradition

The second tradition which we consider begins with Vygotsky. There are two important triangles in Vygotsky’s writings (fig. 1, central column, two triangles in the first generation). The first pertains to the intrapsychological structure of the sign: an auxiliary stimulus mediates a basic stimulus-response relation. The second articulates the interpsychological relation: the mother mediates the relation of the child toward some object – a *subject-other-object* triangle – and this leads to the creation of a *sign*. Each of these triangles will be discussed in turn, followed by a discussion of how these triangles have been developed more recently.

First Generation

Initially, Vygotsky was committed to the stimulus-response paradigm. However, in the mid 1920s, he came to realise that human behaviour is often structurally different from the behaviour of other animals. Specifically, he observed that children do not solve problems in the same way as the chimpanzees that Köhler [1925] observed: unlike chimpanzees, self-talk is often fundamental to problem solving amongst children. In order to account for this, Vygotsky did not abandon the stimulus-response model completely, but instead added a third element, the auxiliary stimulus, which marks a discontinuity in development.

Auxiliary stimuli differ from other stimuli because they possess the function of ‘reverse action’ [Vygotsky & Luria, 1994, p. 145]. An auxiliary stimulus is first of all a response, but then that response itself becomes a stimulus to the organism, calling out a subsequent response. The ‘reverse action’ lies in the fact that the organism’s own response becomes a stimulus to the same organism. Vygotsky often gives the example of the knot in the handkerchief as an *aide-mémoire*. The knot in the handkerchief is a response at time one (to the need to remember something), which will, at time two, be a stimulus to remember the thing to be remembered. Thus, the knot

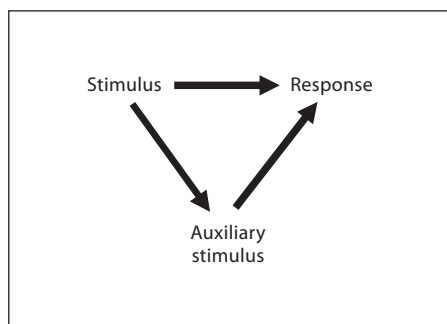


Fig. 2. The auxiliary stimulus.

in the handkerchief is an auxiliary stimulus that mediates natural memory. Similarly, words are auxiliary stimuli. They are responses which can also become stimuli. This is evident, for example, when people react to their own utterances. ‘Reverse action,’ Vygotsky and Luria [1994, p. 145] write, ‘transfers the psychological operation to higher and qualitatively new forms, permitting man, by the aid of outer stimuli, *to control his behaviour from without.*’ Auxiliary stimuli are like tools in that they mediate action, but there is an important difference: while tools enable humans to master the world, it is the reverse action of signs that enable humans to master themselves.

Drawing an auxiliary stimulus does not produce a triangle, but, rather, a ‘V’ shape [e.g., Vygotsky & Luria, 1994, p. 144] (see figure 2). However, because stimuli of the second order coexist with normal stimulus-response relations, a third line can be drawn across the top of the ‘V’, creating a triangle [Cole, 1996, p. 120]. The ‘V’ part of the diagram represents the cultural, or mediated, relation, while the top of the triangle is the natural stimulus-response relation, which coexists with the cultural relation. Although each side of the ‘V’ is also a stimulus-response relation, it must be emphasised that the auxiliary stimulus is qualitatively different to basic stimulus-response relations and, as we shall see, has a distinct developmental trajectory. It is interesting to note the similarity in this distinction between natural and cultural relations and Freud’s distinction between primary and secondary processes.

We can now describe Vygotsky’s first triangle in terms of our four dimensions. (1) This triangle theorises higher mental functions, specifically the dynamics of self-regulation. (2) The corners of the triangle are stimuli and responses, with the third corner being an auxiliary stimulus (both a stimulus and a response). (3) Each of the three sides of the triangle is a stimulus-response relation. (4) Vygotsky’s account of the sign, or auxiliary stimulus, is genetic. However, in order to understand his account of how the sign develops we need to consider Vygotsky’s second triangle. This second triangle emerges as a response to the question of how the cultural relation is formed – or how auxiliary stimuli become established. It is a *subject-other-object* triangle, designating the mutual relationship of child, mother, and object. Although this triangle is not drawn by Vygotsky, and as such is implicit in his writing, it is fundamental to his theorisation of development. It is clearly evident in his account of the development of pointing.

Pointing is an auxiliary stimulus: it is a response to something, which in turn is a stimulus to someone else, or to self (as when a child points to the words he/she is supposed to read). Pointing, Vygotsky [1978, p. 56; 1997, p. 104] argues, develops out of the child's grasping and the mother's response to that grasping. At first the child is not self-conscious of pointing, and thus is not trying to communicate anything. Rather, the child is simply reaching for something out of reach. However, from the perspective of the mother, the child's reaching is meaningful, it indicates that the child desires the reached-for object and accordingly the mother brings the child the desired object. The essential point is that the grasping first has the meaning of pointing for the mother, and only later does it have this meaning for the child. The child comes to know the meaning of his/her grasping by internalising the perspective of the mother, and thus reacting to his/her own gesture in the same way as the mother has reacted. That is to say, the child's response of grasping has become a stimulus for the child (i.e., an auxiliary stimulus).

This *subject-other-object* triangle is fundamentally different to the auxiliary stimulus triangle, which becomes clear when we consider this triangle on our four dimensions. (1) The purpose of this triangle is to theorise the genetic formation of auxiliary stimuli. (2) The corners of the triangle are *subject* (child), *object*, and *other* (mother). (3) The relations along the sides of the triangle are social relations. (4) Auxiliary stimuli, or *signs*, the basis of cultural intelligence, are formed within the child through the interaction.

Before moving on to discuss the ways in which Vygotsky's triangles have been taken up and elaborated, we would like to make brief reference to the work of Mead [1912, 1922]. While one can make historical connections between Mead and Vygotsky through the work of Baldwin, Dewey, and James, there is no evidence to suggest that either Mead or Vygotsky read each other's work [Valsiner & van der Veer, 1988]. This makes the parallels between their ideas particularly striking. Both Mead and Vygotsky take as problematic the nature and genesis of the way in which ideas, or semiotic structures, mediate human action. What is worthy of note is that they both formulate a similar conception of these semiotic structures. Mead's concept of 'significant symbols' and Vygotsky's concept of 'signs' share the idea of reverse action [Gillespie, 2007]. For both Mead and Vygotsky, signs, or significant symbols, do not simply stand for or even mediate an individual's relation to the world, rather they enable the individual to turn upon himself/herself and to mediate himself/herself. The difference between Mead and Vygotsky is in how they account for the genesis of the sign or significant symbol. As we have seen, Vygotsky describes how grasping becomes pointing for the child once the child has internalised the orientation of the mother. For Mead, however, this process of internalisation occurs by virtue of child and mother repeatedly exchanging social roles within a social act [Gillespie, 2005, 2006; Martin, 2006]. Despite this difference in mechanism, however, we argue the similarities between Mead and Vygotsky justify dealing with them as conceptually (not historically) part of the same lineage.

Offspring

The process by which the child-mother-object triangle produces the stimulus-auxiliary stimulus-response triangle has become known as the process of internalisation. The basic idea has proved both influential and controversial. In Russia, the idea was taken forward by Leontiev [1981] in his account of the beater and the hunt.

The beater, by chasing away the prey, acts in a way that contravenes the natural impulse to apprehend prey. The beater's activity can only be understood within a larger system of a division of labour. The beater's activity is subsumed to the interests of the group, who collectively apprehend the prey. Leontiev's point is that the beater's reflective awareness, or mediated relation to self, is a product of the group relations. Thus again we see Vygotsky's basic idea, that the structure of social interaction is transposed into the structure of self-mediation.

More recently, Vygotsky's concept of internalisation has attracted a criticism that it implies a subject-object dualism, because, it has been argued, something moves from the external world to a distinct internal realm [Wertsch & Stone, 1985; Lawrence & Valsiner 1993, 2003; Toomela, 1996; Tomasello, 1999]. This critique has motivated several researchers to cease referring to the intrapsychological, and instead to focus upon clearly observable activities and shared activities [Lave & Wenger, 1991; Rogoff, 1995, 2003] and a new, single, *subject-medium-object* triangle has emerged. In this new triangle, a *medium* (usually a cultural artefact, such as a tool or a word) mediates the *subject's* relation to the *object*. This triangle is, by design, no longer an account of internalisation, and thus does not provide for those researchers interested in the question of the emergence of symbolisation or semiotic mediation [Josephs, 1998; Valsiner 1998, 1999, 2001]. Consequently, some researchers have worked to incorporate Peirce's triadic conception of symbolisation into the *subject-medium-object* triangle [e.g., Moro & Rodriguez, 1992]. However, such theorising, we suggest, does not solve the developmental question – as we have suggested above, Peirce's triad is semiotic, not developmental. Moreover, the move to a *subject-medium-object* triangle can create some theoretical confusion.

Consider, for example, Cole's [1996, p. 119] discussion of the difference between natural and cultural relations. In this discussion, there is a slippage from Vygotsky's auxiliary stimulus model to a *subject-medium-object* model:

Through active attempts to appropriate their surroundings to their own goals, people incorporate auxiliary means (including very significantly, other people) into their actions, giving rise to the distinctive triadic relation of subject-medium-object. [Cole, 1996, p. 119]

Translating stimulus into subject and response into object is problematic. Stimuli and responses are both relations between subjects and objects. This slippage introduces into the triangle a *subject-object* dualism which was not initially in Vygotsky's model. Moreover, this slippage obscures the uniqueness of the auxiliary stimulus as something that can be both interpersonal (as in the *subject-other-object* triangle) and intrapersonal (as in the case of self-regulation). While Cole must simply take the existence and properties of cultural artefacts (the *medium*) as given, Vygotsky's model using stimulus and response terms is powerful enough to articulate both the genesis and the properties of cultural artefacts. In the case of the child grasping, the desired object is the stimulus, the child's grasping is both a response to the object and a stimulus to the mother. Thus, in this case, the auxiliary stimulus is distributed across the relationship between child, other, and object (*subject-other-object* triangle). However, once the perspective of the mother is internalised, and thus the child can react to his/her own grasping as indicating some desire, then the auxiliary stimulus has become partly intrapsychological (i.e., when the child uses pointing to direct his/her own attention) or completely intrapsychological (i.e., when

the child's thought becomes a stimulus for his/her next thought). Thus, while Vygotsky's stimulus-auxiliary stimulus-response triangle makes visible some of the dynamics of internalisation, more recent subject-medium-object triangles obscure this dynamic. However, on the positive side, the more recent *subject-medium-object* triangles seem to be easier to operationalise, as, in complex social contexts outside the laboratory, subject, medium, and object seem to be useful ways of parsing the world. The applicability of this basic idea is evident in the work that has followed from Engeström's [1999] expanded version of the subject-medium-object triangle. Along the base of an extended triangle, Engeström has added rules, community, and division of labour, thus making the model particularly useful for studying institutional activity [e.g., Engeström, Miettinen & Punamäki, 1999], but, we would add, not so useful for studying internalisation.

The Sociocognitive Tradition

The third tradition which we consider begins with Piaget. For Piaget, social interaction was a necessary condition for the development of humans as intelligent beings. However, if this social component of development was explicit in his early texts, it moved to the background in his later writings, in which he appeared to be more interested in exploring the cognitive aspects of the processes of development. Partly due to this difference of emphasis [Döbert, 2004], there is still some disagreement about the role of the social in Piaget's work [Duveen, 1997]. Consequently, it is also unclear to what extent Piaget's work can be seen as triadic. In contrast, the generation of researchers who followed Piaget concentrated their efforts on exploring the consequences of a triadic, that is, a social and cultural, understanding of cognitive development.

First Generation

Piaget was concerned with the development of mental structures, specifically operational structures which he defined as co-ordinated and interiorised actions in the world that can be reversed (e.g., the conservation of liquids). These structures could only develop out of the child's interactions with others and the world. Although he admitted the necessary role of social interaction at a theoretical level, he did not empirically explore the social dimension in the development of operational structures. In his early work, Piaget discusses the role of different types of social relationships in the emergence of knowledge from a theoretical perspective. In his writings on the *Moral Judgment of the Child* [Piaget, 1932], Piaget distinguished two types of social relations: social relations of constraint and social relations of cooperation. There is *constraint* when one participant has more power than the other towards some knowledge. The relationship is asymmetrical, and consequently, the knowledge which can be acquired takes a fixed and inflexible form. Piaget refers to this process as one of social transmission. By contrast, in *cooperative* relations, power is more evenly distributed between participants. A more symmetrical relationship ensues, and the knowledge which emerges is assumed to be more decentred and the result of a coordination of different perspectives. Necessary knowledge [Smith, 1993], the normative form of knowledge that is based on logical implication, can be achieved only through such relations of cooperation. One could describe an implic-

it *subject-other-object* triadic model in such explanation. In a relationship of cooperation, the role of the *other* would be that of supporting and sustaining the development of the *subject* toward the *object*. Piaget gives particular attention to this role in his *Sociological Studies* [Piaget, 1977/1995].

Later on, Piaget came to focus more centrally on the equilibration of cognitive structures within a single cognitive system, and his early orientation to the importance of social processes loses prominence. Thus, although his clinical interviews and experimentation relied heavily on social interaction between adult and child, this facet of his empirical work was only discussed as a methodological introduction in his book on the child's conception of the world [Piaget, 1929] and not as an integrated part of his empirical findings.

Formulating his operative theory of the development of intelligence, Piaget came to conceptualise intelligence as arising from the coordination of actions (the logic of action) and, subsequently, the interiorisation of external acts into mental acts, in a development from sensorimotor reasoning to symbolic and operational intelligence [Furth, 1969]. It is possible to pick out triadic developmental processes in this model. At the sensorimotor level, the infant's functioning can be described as based on two dyadic relationships: the perception of an object creates a figuration of an object, and that figuration creates an action. One might say that the sight of the graspable object automatically elicits a reaction of grasping. In the transition from sensorimotor stage to preoperational thinking, the symbol emerges at the decoupling of these two initially connected relationships, and enables the child to 'know' the object without grasping it. Note that in such triadic constitution of the symbol, there is no explicit need for another person's mediation. The implicit triangle here would be a *subject (operation)-object-sign* one. This may be a model of internal mediation, but it is not an explanation of the role of social interaction in constituting such internal processes [Carpendale & Müller, 2004].

Some of Piaget's collaborators perceived this gap in the model, and partly as reaction to his emphasis on the cognitive, decided to reconsider the role of social interaction in development, as it was presented in Piaget's early work. These studies, later called the 'first generation' of post-Piagetian studies [Perret-Clermont, 1993], examined the role of the other in the construction of intelligence, and of the modes of relationship that the subject could have to the other. A triangle was explicitly used to represent the *subject-other-object* relationship. This triadic theory was partly inspired by readings of Mead [1934], Vygotsky, the sociological work of Bernstein [see Perret-Clermont, 1980], as well as the impulse of Moscovici [1972; see Mugny, Perret-Clermont, & Doise, 1981], which encouraged a reorientation from dyadic to triadic theories in social psychology.

One explicit outcome of the resocialisation of Piaget's work was the notion of *sociocognitive conflict*. The notion designated the fact that subject and other could have divergent perspectives on the same object. The subject could then interiorise these divergent perspectives, which could, under some conditions – a symmetrical relationship, concentration on the task rather than on the interpersonal relationship [Mugny, De Paolis, & Carugati, 1984] – create a decentration, leading to a new cognitive elaboration. The cognitive coordination of social perspectives was thus posed as a crucial developmental mechanism.

This line of research can be described in terms of our four dimensions as follows. (1) The question is: how do social interactions contribute to the emergence of

more complex operational structures? (2) The triangle is a *subject-other-object* triangle. (3) The *subject-other* relationship is embedded in the social fabric; each subject constructs a representation of the *object* through interiorised actions in his or her own way. (4) Development is here seen as linked to the interiorisation and coordination of conflicting perspectives.

Offspring

Different threads of research followed these studies working with a sociocognitive triangle metaphor. A first line of research can be said to have tried to overcome the lack of the 'social' in Piaget by extending the *subject-other* relationship to a sociocognitive triangle. Chapman [1991, 1999] sought to emphasise the social aspects of Piagetian theorising, drawing on Vygotskyian insights. He called his conception of the *subject-other-object* triangle an 'epistemic triangle,' and described it in terms of two subsystems of binary relations (*subject-object*, *subject-other*). Chapman considers the subject-object interactions as asymmetrical since the subject is active and the object merely conforms (or not) to the expectations of the subject. He then considered subject-other interactions, with development becoming more and more symmetrical in the sense that both participants become capable of taking the same active roles in turn. In much of the post-Piagetian work on the epistemic triangle, the importance of the social dimension is formulated in terms of the interaction of differing intentional beings [e.g., Müller & Carpendale, 2000, 2004; Tomasello, 1999]. But these intentional participants are not typically considered in terms of their socially structured roles, which shape and constrain the perspectives that they can adopt towards the object of knowledge.

A second line of post-Piagetian research has deepened the understanding of the 'social' dimension of the sociocognitive triangle. The meaning of 'social' here is not the mere presence of the other, or the fact that one subject can understand the other's intentions, but the fact that the whole *subject-other-object* system takes place in a social world, that is, a world structured by social positions, values, rules, and discourses. Thus, factors such as gender, age, perceived status, or cultural capital all constitute the social positions and thus the perspectives of the participants in an epistemic triangle. It was argued that higher 'levels of analysis' should be brought into the explanation of cognitive development, to examine not only interpersonal dynamics, but also intergroup and ideological ones [Doise, 1986].

A notable feature of this second generation of post-Piagetian studies was its attention to the particular character of the *object* of knowledge, from the point of view that different objects have different significances to the participants, and that these are often shaped by the institutional context of the interaction. Schubauer-Leoni and Perret-Clermont [1997], reflecting on the trajectory of their own research, suggested that during the 'first generation,' the new interest in social interaction had come to dominate the consideration of the *subject-other-object* triangle, so that the object dropped out of focus, to leave a rather bipolar interest in subject-other relations. In the 'second generation,' they write,

when we started to take more explicitly into consideration the type of task set at the center of the joint activity ... it became obvious that the object played a central role not only as a 'task' but also as a mediation permitting the specification of a system of social positions in which the adult is in a high position asking the questions. Formerly bipolar (subject-

object; or peer-peer), the model becomes now clearly tripolar: questioner-questionee(s)-object and integrates the experiment as constituent of the observation. [Schubauer-Leoni & Perret-Clermont, 1997, p. 271]

In this approach, the particular object about which knowledge is being created has an impact on the relationships between the participants and the process of their interaction. The significance of the object is shaped by the institutional context in which it is located, and entails social expectations about how each participant is going to relate to that object [Grossen & Perret-Clermont, 1994; Perret-Clermont, Perret, & Bell 1991; Schoultz, Säljö & Wyndhamn, 2001; Schubauer-Leoni & Grossen, 1993]. For example, the object 'mathematical problem' is defined by the educational institution. In the frame of a classroom, the mathematical problem can make a student feel incompetent in front of an other identified as a good student. It has a power to lead some people to be classified as weak students, and others to be supported to pursue further studies. Such observations also led researchers to reflect on their role in testing situations.

More recently, other authors proposed a 'third generation' of post-Piagetian studies by locating configurations of *subject-other-object* triangle in their societal context [Duveen & Psaltis, in press; Psaltis, 2005a, b] and claiming a constructive role for social asymmetries. Such studies have shown how children's interactions around a task are modulated by social representations of gender so that asymmetries themselves can become constructive. Gendered expectations of expertise, for instance, in the primary school classroom shaped interactions between boys and girls on a conservation of liquid task. For some non-conserving boys, a conserving girl proved to be a surprise, stimulating cognitive activity, and subsequent improvement on the conservation task [Psaltis & Duveen, 2006, 2007].

Relations between the Triangles

Our initial question was how triangle models could contribute to a psychology of development, and especially, to a psychology of development in which the social is constitutive. We can now summarise the main specificities, commonalities, and contributions of each triangle.

Distinctions

In the emotional triangles, two persons respond to and influence each others' emotions and representations through the use of signs. The mediational triangles focus on the mediation of the person's relation to an object (including a reflexive relation to oneself as an object) through the use of signs. The sociocognitive triangles link two persons and an object, around which an interaction, thinking, and action take place. It shows the role of communication and identities in the development of knowledge.

The psychological processes through which development is thought to occur in each tradition are also distinct. In the emotional triangles, emotions are fundamental in the relationship of the person to himself/herself, the other, and objects. Objects

or other are then replaced by signs, and even these are emotionally laden, although some of their function is precisely to elaborate these emotions. The mediational triangles emphasise the responses of others as fundamental in constituting the meaning of an object or gesture for the child. Signs within this tradition are entwined with the other, and enable self-regulation from the standpoint of the other. In the socio-cognitive tradition, it is conflicts between different representations of the object that are the occasion for development, with the existence and awareness of such conflicts being stimulated by the different social positions occupied by the participants.

Similarities

There are some interesting parallels between the various triangles. For example, there are two striking similarities between Vygotsky and psycho-analysis. Firstly, they both have comparable triangular theories of the nature of symbolic thinking (representation). In psycho-analysis, the representation is formed by a combination of a need and the memory of satisfaction of that need by an other. In Vygotsky, the representation is formed by a combination of the person's response (which could be seen as a need) and the memory, or imagination, of how this response appears to others. Both of these theories are thus similar to Mead's theory of signs being formed through the combination of an embodied actor perspective (desires and responses) with a more distant observer's perspective (the other's reaction to that desire or response) [Mead, 1922; Gillespie, 2005].

Secondly, both Freud and Vygotsky have an understanding of the role of *other* as providing the *subject* with *signs* which enable the transformation of an experience into meaning. This is visible in the parallel between the model of the therapeutic relation in Freud and the adult-child relationship in Vygotsky. The psycho-analytical patient, like Vygotsky's grasping child, expresses something without knowing its meaning for the other. The patient recounts a dream. The therapeutic relation hinges upon the analyst finding surplus meaning [Gillespie, 2003] in the dream, and then feeding this interpretation back to the patient. The therapist guides the patient to a new understanding of his/her own dream, so that there is consciousness where previously there was unconsciousness [Wilson & Weinstein, 1997]. This process is structurally very similar to the process through which the child develops an understanding of pointing through the adult's recognition of his/her grasping. Contemporary research using experimental and observational methods confirms the importance of such triadic relations in the development of symbolic thinking. Fonagy et al. [2002] show, for example, how the child's disorganised physical actions linked to their state of affect need to be answered in a relatively predictable way, and labelled or commented upon by his mother or father (e.g., 'oh, this is my hungry boy!'). That is to say, the action requires recognition by an *other*, who provides the sign for self to make sense of self's own action.

There is also an important similarity between the sociocognitive and emotional triangles, in that both give weight to the other's recognition of the person and his/her action. In the sociocognitive triangle, the participants are not oriented only towards the object, but also towards each other, and for knowledge to develop it requires a mutual recognition of the (possible) validity of each others' orientation to the object. In the emotional triangle, the development of signs depends upon the

other appropriately recognising the emotional state of the person and his/her representation of the object, as well as the possible divergences between the participants' representations and emotions. Recent formulations of sociocognitive approaches, integrating advances in theory of mind research, can also be seen as speaking to the same question of recognition [Garton & Pratt, 2001; Howley & Howe, 2004].

Finally, the first generations of all three triangles put forward a structurally similar model of development. In each case, actions and interactions taking place in a socially shared reality are internalised to a mental plane, leading to the transformation of the thinking of the person, and in turn changing the subject's capacity for acting and interacting. The subject appears, not as a disembodied cognitive subject, but as an embodied social being, whose capacity for thinking and acting are highly dependent on his/her emotions and sense of identity, which in turn depend upon the interpersonal context.

Contributions of the Genealogical Analysis

This paper set out two aims: clarifying the historical origins of contemporary triadic models, and extracting key themes for a theory of the role of the social in development. In order to do so, a genealogical reading of triangle metaphors in developmental psychology has been proposed. What can we learn from this genealogical reading?

Firstly, in response to our historical aim, the genealogy has brought out the historical continuities within the various traditions and has identified some striking similarities between traditions. But it has also revealed important historical discontinuities and differences, which might otherwise be obfuscated by the veneer of similarity provided by a common metaphor. By historically tracing the different meanings of the various triangles, we have clarified a terminology for the various configurations of developmental triangles – with combinations of the terms 'subject,' 'sign,' 'other,' and 'object' designating the corners, and having distinguished different relations between these terms: representational, emotional, and mediational.

This work of clarification can help us in reading contemporary work. Let us consider, for instance, Hobson's [2002] theory of development, articulated in a triangle of the infant, the world, and the other (initially the mother): a *subject-other-object* triangle. For Hobson, the mechanism of development is 'a particular species of identification' (p. 106). While the infant acts toward the world, the other acts toward the infant's action. Then, by degrees, the infant is led to identify with the other, thus coming to adopt the perspective of the other, and thus cultivating a perspective upon self. Reading this triangle through the distinctions that we have made, the constituents of Hobson's triangle match those of the sociocognitive tradition, but the driving psychological processes are emotional ones. According to our analysis, historically, such emotional triangles required a *subject-sign-other* configuration to explain the move from the social relations to psychological development. Similarly, if the perspective of *other* becomes a means to transform the *subject's* relation to the *object*, then the perspective of other has to become a *sign* in a *subject-object-sign* relationship. In other words, our analysis suggests that the *subject-object-sign* triangle could be incorporated into Hobson's analysis in order to further specify the process of internalisation.

Secondly, in relation to our theoretical aim of identifying core ideas for understanding the social constitution of psychological development, our analysis flags two quite different approaches over time. It is notable that each ‘first generation’ theory proposed two triangles, with a more ‘social’ one turning into a more ‘mental’ one. These early generation theorists used a duality between social and mental, in order to consider the relation between them. However, in later generations (of the mediational and sociocognitive triangles), authors have been less comfortable with the notion of a distinct ‘internal’ mental space, seeing this as a subject-world dualism, and thus, have tended to use single triangles, focused on the ‘social’ phase of the process of development (*subject-other-object*, or *subject-mediator-object*). In the mediational tradition, this process can be seen in the turn to ethnography and observation [Cole, 1996; Rogoff, 1995]. Yet it has been suggested that effacing the intrapsychological component of triangle models makes it impossible to have a developmental theory, strictly speaking [Toomela, 1999; Valsiner, 2006], in the sense of the emergence of qualitative psychological change. Inversely, the emotional tradition has often neglected the necessary social interactions for the emergence of mind.

Our historical reading highlights important features of development as modelled by triangles that merit further research. For example, dynamics of social recognition have been noted as important in the sociocognitive and the mediational tradition. In the emotional one, the emotional quality of the recognition can shape the elaboration of signs, and consequently reflections about the self. Given that each tradition hints towards the importance of recognition, further integrative theorising that borrows from all three traditions may be fruitful [Psaltis & Duveen, 2007]. A further issue identified, but to date not fully investigated, is the role of the social context in the wider sense: the ideological and institutional constitution of those interpersonal relations that are the setting for development.

Conclusion

This paper has proposed a critical examination of the uses of the metaphor of a triangle as a tool for developmental psychology. We described three main uses of triangles, which we called emotional, mediational, and sociocognitive. Freud, Vygotsky, and Piaget, who we identified as authors of the first generations of triangle models, all used at least two states of their triangles. In each case, their first triangle modelled some form of mediated interaction, either *person-other-object* or *person-tool-object*. The second triangle represented an intrapsychological triangle, either in the form of *person time 1-sign-person time 2*, or *person-sign (operation)-object*. The developmental theory is thus that development is a process of moving from the first, interactional triangle to the second, self-regulating triangle.

Authors working in the line opened by these first generation theorists have taken various approaches, some focusing on only one of the triangles of the first generation, others combining two of the developmental triangles, and others combining one of the first generation triangles with a non-developmental triangle such as Peirce’s [Chapman, 1991, 1999; Moro & Rodriguez, 1992].

We can see some of the recent attempts to develop new triangles as addressing the limitation of the three terms of initial triangles. Authors of the first generation

were interested in ontogenetic development; that is, the aim was to show how a function was constructed for the first time in the developing child. Given such a focus, a limitation to three terms can be helpful. Thus, for instance, motor interaction in a preverbal infant can profitably be modelled as a *person-object-other* interaction. Or the *person-sign-object* triangle can show the emergence of sign use. However, a limitation of these models emerged when trying to understand processes of development in later years and in adulthood, which seem to call for the interdependency of at least four constituents. If, as many researchers now acknowledge, we consider that development is an ongoing, lifelong process, then three-term models are insufficient. For instance, a child who is already capable of social interaction and speech can be solving a puzzle alternating speech to self and talking to another person. Similarly, an adult solving a new computing task usually draws simultaneously on his/her cognitive resources while asking co-workers for advice, or by using a manual – a cultural tool – to support his/her thinking. In other words, if we want to account for lifelong development, beyond ontogenesis (the initial construction of psychological functions), in the subsequent genesis of further skills and knowledge, person, other, object, and sign are all likely to be co-present.

There are many ways of including these four components in our theories. We can write textually about them, we can try to represent them through new models which graphically represent transformations or reconfigurations of triangles, or we might even do away with the triangle metaphor and choose a new metaphor with four poles. It is to overcome such limitations of the initial core triangles that various authors have thus proposed alternative metaphors: Werner and Kaplan's [1963] addressor-addressee-object-symbol model, the expanded neo-Vygotskian triangle [Engeström, 1999, 2005], the triangle of the inner alter in dialogical thinking [Marková, 2006], variations of prism models [Zittoun & Perret-Clermont, in press, Zittoun, 2006] or embedded triangles [Psaltis, 2005a]. Thus, as with other tools, metaphors have their affordances, their side-effects, and their unexpected consequences. Awareness of what our tools were designed to do, and how they have developed, can facilitate an informed use of them. But if there is a discrepancy between the effects of the tool and one's original aims, one might want to invent a new one.

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