

11 Mirror Games

Wolfgang PRINZ

Abstract. It is sometimes claimed that individuals come to shape their own minds through looking into the mirror of others (Social Mirroring). Social mirroring has two sides to it: mirroring (individual 1 mirrors individual 2) and understanding being mirrored (individual 2 understands that s/he is being mirrored by individual 1). Social mirroring comes in various guises, arising from different modes of mirroring and different modes of communication. In this chapter I argue that two basic requirements must be fulfilled for social mirroring to work, a functional and a social one. The functional requirement refers to the operation of representational devices with mirror-like properties (mirrors inside). The social requirement refers to discourses and practices for using and exploiting mirrors inside in social interaction ("mirror games" and "mirror policies")

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11.1 Others as mirrors for self

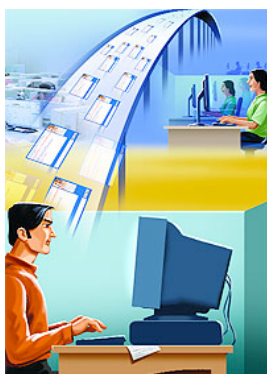
In his *Theory of Moral Sentiments*, which first appeared in 1759, the Scottish philosopher Adam Smith raised, among many other things, the issue of how people come to understand and appraise their own conduct. Let me start with a short quotation summarizing his view on how an individual perceives his/her own actions:

"... these are objects which he cannot easily see, which naturally he does not look at, and with regard to which he is not provided with [a] mirror. [That mirror] is placed in the countenance and behaviour of those he lives with [...]; and it is here that he first views the propriety and impropriety of his own passions, the beauty and deformity of his own mind." (Smith, 1759/1976, p. 110).

The notion here is that individuals come to perceive and understand themselves through mirroring themselves in others – that is by understanding how their conduct is perceived, received, and understood by others. What this suggests is

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that social mirrors can take for individuals a similar role as physical mirrors do: Both help them to perceive themselves in the same way as others perceive them [1-3].

The notion of social mirroring is widespread in the social sciences. In this chapter I take a look at social mirrors from a cognitive science perspective. In the cognitive science domain this notion has recently been discovered, or rediscovered in various branches, such as Neurophysiology [4-7], NeuroImaging [8-12], Cognitive Psychology [3, 13, 14], Developmental Psychology [15-18] and Social Psychology [19-21]. Notably, the discovery of mirror neurons and mirror systems in the monkey and the human brain has given rise to a growing literature on the possible role of mirror-like devices for self recognition and social interaction [22-25]. In most of these research traditions and their associated literatures the concept of mirror is used as a metaphor that stands for close functional relationships between action perception and production.

In this chapter I raise the issue whether there is anything serious behind the metaphorical use of the notion of mirroring in the context of self-recognition and self-reflection. I will argue that social mirroring can indeed play an important role for the formation of the self, provided that mirrors outside are met by mirrors inside. By mirrors outside I refer to social mirrors that individuals encounter in their environments. By mirrors inside I refer to mirror-like representational devices operating inside their minds. These two kinds of mirrors, I suggest, interact with each other in ways that give rise to the formation of the mental self.

11.2 Varieties of mirroring

Social mirroring has two sides to it: that of the target individual T whose acting is being mirrored, and that of the mirror individual M who is mirroring T's acting. For the target individual, T, the mirror individual, M, provides a living mirror that exists in her environment in the same way as physical mirrors do. In the following I discuss in what ways M can mirror T and how T can find her own action mirrored through M's action. For answering these questions, it may be useful to draw two distinctions, one between two basic *modes of mirroring* (*reciprocal vs. complementary*), and another one between two *modes of communication* (*embodied vs. symbolic*).

11.2.1 Modes of mirroring

In the most fundamental form of social mirroring, T sees her own action imitated, or replicated by M (*reciprocal mirroring*). In a setting like this, the other (M) acts as a mirror for self (T) in a more or less literal sense. Social mirrors are of course fundamentally different from physical mirrors. Even if M attempts to provide as-perfect-as-possible copies of T's acting, those copies will always be delayed in time, and their kinematics will never be as perfectly correlated with T's acting as specular images are. Obviously, the mirror-like appearance of M's action will become even poorer when M does not even try to provide a perfect copy of T's action (or, perhaps, even a systematically distorted one).

Reciprocal mirroring can only work if these distortions are limited. We can only speak of reciprocal mirroring as long as T is in a position to recognize and

understand M's acting as a delayed copy of her own preceding acting. As long as this condition is fulfilled, we may leave it open what the grain size of appropriate action units and the magnitude of acceptable delays may be. Hence, the constitutive feature of reciprocal mirroring is T's understanding of M's action *as a copy of T's* preceding own action.

A slightly different form of social mirroring arises when T sees her own action continued and carried on by M rather than replicated (*complementary mirroring*). In a setting like this, the other (M) does not act as a mirror in the strict sense of reflecting self's own preceding action but only in the loose sense of continuing that action in a meaningful way. This is, of course, entirely different from what physical mirrors do. Still, what complementary mirroring has in common with reciprocal mirroring is (1) that M's action is strongly contingent upon T's preceding action, and (2) that this contingency needs to be perceived and understood by T. In this case, too, the reach of mirroring goes as far as T is in a position to assess M's doing *as a meaningful continuation* of her own doing.

11.2.2 Modes of communication

The examples considered so far draw on what we may call mirroring through embodied communication. It starts with T acting in a particular way; then M, upon perceiving T's acting, starts replicating or continuing that action, and eventually that replication/continuation is perceived and somehow "understood" by T. Communication is here embodied in the sense that it relies on T's and M's competence for both production of own action and perception of foreign action. Such *embodied mirroring* does not require a language system in which the two communicate. It does not even require explicit intentions to communicate something to someone else on either side. The sole requirement is that competent perceivers/actors meet and interact. However, this does not mean that embodied mirroring relies on primitive representational resources. Though it does not require language, it does, in fact, require a smart machinery for action production and action perception.

Routines for embodied mirroring play an important role in interactions between young infants and their caretakers. Babies and their mothers will often find themselves involved in what has been called protoconversational interactions, i.e. interactions involving mutual imitation and continuation of actions and emotional expressions and taking turns in this funny game from time to time. Such interactions have been extensively studied, particularly with regard to the development of imitation and its underlying mechanisms. Most of these studies focus on the baby's production, but not on her perception of imitative action [18, 26-30]. In other words, this work views the baby in the role of individual M (who mirrors mother's actions) but not in the role of individual T (who perceives herself being mirrored by mother). This is, however, precisely the perspective that one needs to adopt in order to understand how social mirroring can contribute to the formation of the self. Unfortunately, literature on this perspective is scarce. Sensitivity to being imitated has only occasionally been studied in babies [18, 31-33]. Quite surprisingly, a recent study has demonstrated such sensitivity in macaques as well [34].

More familiar to adults is action mirroring through symbolic communication. T acts in a particular way, and M, upon perceiving T's acting, starts talking about T's

acting, and that verbal account is finally perceived and “understood” by T *as referring to* her own preceding acting. In a setting like this, M’s verbal account of T’s acting cannot only vary along the dimension of replication/continuation but also along the dimension of description/explanation/evaluation. In any case *such symbolic mirroring* is dependent on the two individuals’ competences for the production and perception of spoken language. M communicates to T a verbal message concerning T’s action, and that message is then decoded and understood by T.

Competences for production and perception of spoken language may thus be necessary conditions for symbolic mirroring to work, but they are certainly not sufficient. On top of speaking and listening to each other, the two individuals need to share a conceptual framework for the description and explanation of action. They need to draw on a shared action ontology that entails a common understanding of what actions are, how they can be parsed and individuated, and how physical action can be explained through foregoing mental action. This is precisely what folk psychology delivers us: a common-sense framework for the description and explanation of action to which we resort when we reflect and communicate about what people are doing and why they do what they do [35-39].

11.3 Mirrors inside

What kinds of representational resources does our target individual T need to have in order to be in a position to capitalize on M’s mirroring for building up a representation of self? Evidently the mere fact of being mirrored from the outside will not do the job by itself. Pet owners, for instance, will often entertain mirror conversations with their cats and dogs all day long – without any obvious consequences for the animals’ mental architectures. Human babies seem to be different in that respect. They do exploit social mirrors for shaping and, in fact, for making their minds. What, then, do humans have that cats and dogs do not have? Humans have mirrors inside. Mirrors inside are representational devices that help them to exploit what mirrors outside afford. Basically, these devices serve to couple perception and action. But they do so in a special way, allowing for the operation of similarity between what comes in and what goes out.

11.3.1 Design principles

How do these mirror devices work and how do they interact with mirrors outside? Here is the functional problem to be solved. Consider individual T, watching what M is doing. Suppose that M will occasionally mirror T, but that, for most of the time, M will be doing something else. This raises the problem how T can tell mirroring from non-mirroring in M’s actions. As long as this problem is unsolved, T will not be in a position to capitalize on what the social mirror facing her affords. Mirror devices solve this problem by virtue of two basic design principles, common coding and distal reference.

The notion of *common coding* posits a shared representational domain for perception and action. Common coding invokes that the same representational resources are used for both planning and control of own action and perception of foreign action. In other words, tokens of own action will get their entries in that

space on exactly the same dimensions as tokens of foreign action [14, 40-43]. Common coding makes it possible both to perceive and produce similarity between own action and foreign action. This has important implications for either of our two model individuals, M, the producer, and T, the perceiver of similarity. As concerns production, M's mirroring of T's acting will rely on production of own action that resembles perceived foreign action. Conversely, as concerns perception, T's understanding of the mirror nature of M's action will rely on the perception of foreign action that resembles previous self-produced action. Common coding is thus a prerequisite for the mirror game between the two to work.

How can representations of own and foreign action be commensurate? The key feature here is *distal reference*. Distal reference is fairly obvious on the perceptual side [44-46]. What we see and what we hear are neither patterns of sensory stimulation nor patterns of brain activation. Instead, we perceive objects and events in the environment – distal events rather than proximal stimuli or even central activations. No less obvious is distal reference on the action side. For instance, when we plan to hammer a nail into the wall, that planning does not refer to muscle contractions or to activations in the motor cortex. Instead, it refers to the planned action and its intended outcome in the environment [47, 48].

Distal reference has two important implications: efficiency and publicity. In virtue of distal reference, perceptual representations are efficient in the sense of representing environmental events in a way that satisfies the needs for successful interaction with them. Likewise, goal representations are efficient in the sense of effectuating the actions required to reach the pertinent goals [49]. The other implication is publicity. In virtue of distal reference, mental representations for perception and action control are public in the sense of representing events in a way that satisfies the needs for successful communication about them. They always refer to public events in the environment.

These two design principles make up for mirrors inside. These mirrors go either way – to produce own action resembling perceived foreign action and to perceive foreign action resembling own action. Their operation is based on priming through similarity: perceived foreign action will prime corresponding own action, and likewise will own action prime the perception of corresponding foreign action.

11.3.2 Embodied and symbolic devices

So much about design principles. How are mirrors instantiated inside the human mind? This question brings us back to the two basic modes of mirroring: embodied and symbolic. Embodied devices operate on implicit procedural *knowledge for* the perception and control of bodies and actions. This knowledge is likely to be contained in representational structures that build on innate resources. Conversely, symbolic devices operate on explicit declarative *knowledge about* bodies and actions. That knowledge is contained in representational structures that build on acquired, language-based resources.

Without going into much detail, let me briefly mention what I mean by these devices. *On the embodied side* we may discern mirror devices like body schemes, action schemes, and, perhaps, emotion schemes. As I have argued elsewhere [3], the representational capacities of these devices are, from the outset, shared between perception and production and, hence, between others and self. One may

even invoke that they are first developed for others and then projected back to self – a view that poses a challenge to the widely accepted notion that knowledge of self is the natural fundament for knowledge of others.

On the symbolic side individuals have a rich conceptual framework for action identification, comprehension, and evaluation at their disposal – a framework that forms the core of their folk-psychology beliefs about the mental dynamics of human action. That framework gets acquired and continuously shaped in language-based interaction and communication. From the outset, it equally applies to both, others and self. And again, some would argue that this framework, too, gets first developed for understanding what others do, and only later becomes applied to planning one's own doings.

The notion of embodied and symbolic mirrors opens a fascinating research agenda on how these devices emerge, how they work, and how they get shaped through embodied and symbolic forms of learning and communication. Yet, here I will not address this agenda. For the rest of the chapter I take it for granted that embodied and symbolic mirror devices are in place and examine how they are used in mirror games.

11.4 Mirror games

Mirror devices give a promise that cannot always be fulfilled. For instance, for individuals like Robinson Crusoe who live in isolation, devices like body or action schemes cannot fulfill their mirror function. To fulfill the promise, two basic conditions must be met. One is that other individuals need to be around. This is what Friday's advent affords: mirrors inside need to be complemented by mirrors outside. The other is that the two individuals need to interact in particular ways. This is what their reciprocal acting and talking affords: they need to engage in mirror games. Mirror games are, in other words, social practices designed to confront mirrors inside with mirrors outside.

We may discern two basic kinds of such games, symbolic and embodied. While symbolic games rely on reciprocal talking about action, embodied games rely on reciprocal acting. Here I use the terms of *attribution discourse* and *mirror practices* for symbolic and embodied games, respectively.

Attribution discourses: Attribution discourses provide culturally standardized schemes of interpretation of, and communication about, human conduct. These discourses attribute to individuals a mental configuration centred around a self. Such discourses permeate our daily life at several levels, predominantly, for instance, when using psychological common sense to explain people's actions. Folk psychology is based upon the idea of a subject having an explicit, lifelong identical self at its core. Discourse about morals and rights are no less relevant when they identify the self as an autonomous source of decisions to act.

Such discourses are often embedded in narrative discourses of various kinds. Fictional stories in books and movies are packed with talk about willing and behaving. We tell stories to our children in order to explain to them just what it means to be a person. We thereby provide them with two tools. One is the explicit semantics of the culture in which they live – its customs and practices, values and standards, myths and legends. The other is the implicit syntax of its folk psychology, which specifies how human agents function, what they think and do,

how their thinking is related to their doing, and how they are rewarded or punished for their doings – be it in heaven or on earth.

Now, when agents in social groups organize their mutual interaction and communication in a way that each one expects all the other co-agents to also have a self, everyone of the agents – new arrivals, too – is confronted with a situation that already provides a role for her – in the shape of a self. Awareness of foreign ascriptions to oneself induces self-ascriptions, and the agent becomes accustomed to the role of a self ascribed to her by others. A person thinks of herself as others think of her.

Mirror practices: While attribution discourses rely on exchange of declarative knowledge about action, mirror practices rely on interactions based on procedural knowledge for action perception and production. In early infancy embodied mirroring is the only game in town. For caretakers the practice of reciprocating or continuing the baby's doings is common and widespread – perhaps even a human universal. For babies these games seem to be of crucial importance for tuning in with, and becoming attached to others, as well as laying the ground for perceiving and understanding themselves like others.

In no way are embodied mirror games limited to interactions between caretakers and infants, however. They also apply to interactions among grown-ups. For instance, an individual may cross his arms behind his head while facing another individual doing the same (reciprocation). Likewise an individual may take up another individual's work (say washing a car) when the other is temporarily withdrawn (continuation). In the same way individuals may accompany other individuals' acting through pertinent facial and bodily gestures, thereby commenting on that acting in a non-verbal format. As a rule such action-based mirroring is not really cultivated as a social practice. Individuals will often have no explicit intention to communicate anything to others and they may not even be aware of what they are doing. Their mirroring reflects automatized habits [20, 50], and sometimes these habits are even considered to be inappropriate conduct that ought to be suppressed. Still, from the viewpoint of the others, these implicit habits have exactly the same consequences as explicit practices: They let people perceive and receive their own doing through the mirror of somebody else.

There are two perspectives here. One is related to the experience that others are/act like self. This aspect of the game has been shown to be a crucial factor for the formation of social bonding and coherence [51, 52]. The other relates to the converse experience that self is/acts like others. This aspect of the game, which has to date received less attention, may in fact prove to be a crucial factor for the formation of the self in the first place [53, 54]. By engaging in mirror games, people make capital out of their capacity to *understand* mentality and agency in others for *construing* mentality and agency in themselves. In a way, then, mirror games exploit others for building selves.

11.5 Mirror policies

We should not think of mirror games as pieces of interaction that get automatically started when people meet each other, but rather as being embedded in what one could call mirror policies. By this term I refer to traits, states, and strategies that

may govern individuals' readiness to engage and become engaged in mirror games.

We may discern two basic dimensions on which mirror policies vary. One concerns the conditions under which an individual is prone to imitate others and/or become imitated by others. As recent evidence suggests [55-57] even newborns may, at times, not only be prepared to imitate certain gestures, but even to provoke imitative responses by their caretakers. Mirroring and being mirrored is thus controlled for them by their proneness to become engaged in the game.

The other dimension of mirror policies concerns selectivity. Individuals may in fact be quite selective in playing mirror games. For instance, they may mirror some kinds of behaviours, but not others. They may engage in mirror games under certain circumstances, but not under others. And, most importantly, they may be selective with respect to the target individuals whom they grant their mirroring. They may be prone to mirror certain individuals, but refuse to mirror others. For instance, they may tend to mirror their kids, their folks, and perhaps their peers, but perhaps not – or to a much lesser degree – strangers, disabled individuals, or elderly people. We can, therefore, think of each mirror individual as entertaining an implicit list of target individuals with whom s/he is prone to engage in mirror games, and of each target individual as being included in some individuals' target lists, but excluded from some other individuals' lists.

This way mirror policies act to induce both social assimilation and dissimilation. Assimilation is based on the dialectics of mirroring and perceiving being mirrored. Likewise, dissimilation is based on the dialectics of refusing to mirror and perceiving being refused. In principle, mirror policies rely on both, symbolic discourses and embodied practices. In any case embodied practices will add to the various sorts of symbolic discourses through which social relations are established and maintained in the first place.

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