

Intention

Intention is a mental state that represents a commitment to carrying out an action or actions in the future. Intention involves mental activities such as planning and forethought.^[1]

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Definition

Folk psychology explains human behavior on the basis of mental states, including beliefs, desires, and intentions.^[2]^[3] Mental mechanisms, including intention, explain behavior in that individuals are seen as actors who have desires and who attempt to achieve goals that are directed by beliefs.^[4] Thus, an intentional action is a function to accomplish a desired goal and is based on the belief that the course of action will satisfy a desire.^[4]

There is also a theoretical distinction between intentionality (intentional actions), and a mental state of intention for the future.^[5] Searle (1983) labeled these as intention-in-action and prior intention respectively. Prior intentions reflect forethought about intentions-in-action; prior intentions do not need to be carried out to be considered intentions.^[5] An unfulfilled intention is a prior intention that has no action associated with it.^[5]

Astington (1993)^[2] outlined the connections between mental states (desires, beliefs, and intentions) and actions carried out by an individual in order to reach a goal; these connections are referred to as the Intentional Chain. The proposed connective chain is that desire causes intention, which causes action, which causes outcome. The Intentional Chain maps the linking of a desire to the satisfaction of a goal via the intermediary intention.^[2]

The development of an understanding of intention

Psychological research suggests that understanding intentions of others may be a prerequisite for a higher-level understanding of other people's minds or theory of mind.^[6] Theory of mind research attempts to map how children come to understand the mind as a representational device for the world.^[7] This research has focused on the

development of knowledge that others have beliefs, desires, and intentions that are different from one's own. A basic ability to comprehend other people's intentions based on their actions is critical to the development of theory of mind.^[6]

Understanding intention is thought to be pivotal in understanding social contexts in numerous ways. First, acquiring an understanding of intention is important for development in that it helps children conceptualize how people and animals differ from objects. Much of behavior is caused by intentions, and understanding intentions helps to interpret these behaviors.^[8] Second, intentions are integral to an understanding of morality.^[9] Children learn to assign praise or blame based on whether actions of others are intentional. Intention is also necessary to understand and predict the plans and future actions of others.^[1] Understanding the intentions and motives of others aids in the interpretation of communication,^{[10][11]} and the achievement of cooperative goals.^[12] Social, cognitive and developmental psychological research has focused on the question: How do young children develop the ability to understand other people's behaviors and intentions?

Intentional acts in infancy and childhood

From an early age, typically-developing children parse human actions in terms of goals, rather than in terms of movements in space, or muscle movements.^[13] Meltzoff (1995)^[14] conducted a study in which 18-month-olds were shown an unsuccessful act. For instance, children watched an adult accidentally under or over shoot a target, or attempt to perform an action but their hand slipped. The aim of the study was to determine whether the children were able to interpret the intention of the adult, regardless of the actual action performed. Young children have a tendency to imitate other people's actions. The outcome measure was what the child chose to re-enact—the actual event (literal motions), or the adult's goal, which was not accomplished.^[14] The results of the study suggested that 18-month-olds are able to infer unseen goals and intentions of others based on their actions. Infants who saw unsuccessful attempts at a target act and infants who saw the target act imitated the act at a higher rate than infants who saw neither the act nor an attempt.^[14] Similar paradigms were conducted with children 9 months old and 15 months old. Nine-month-olds did not respond to the unsuccessful attempt demonstrations; however, 15-month-olds acted similarly to the 18-month-olds. This suggests that between 9 months and 15 months of age the ability to infer intentions in other people develops.^[13]

The development of understanding intention has also been studied in toddlers. As mentioned previously, an intentional action is based on the belief that the course of action will satisfy a desire.^[7] In that case, what was intended can be interpreted as a function of an understanding for what was desired. When outcomes are achieved without the action of the individual directed at the goal, intention is not attributed to the actor; rather, the event is considered an accident.^[5] Research by Astington and colleagues (1993)^[2] found that 3-year-olds are skilled at matching goals to outcomes to infer intention. If another individual's goals match an outcome, 3-year-olds are able to conclude that the action was done “on purpose.” Conversely, when goals do not match outcomes, the children labeled the individual's actions as accidental.^[2] Children may come to distinguish between desire and intention when they learn to view the mind as a medium for representations of the world.^[15] Astington argues that initially desire is undifferentiated from intention in that both function as a goal state. Children then develop a more mature command of understanding other's intentions when they are able to represent an action as caused by a prior intention that is separate from desire.^[15]

Thus, research suggests that by the age of fifteen months, humans are capable of understanding intentional acts in others.^[13] The ability to distinguish between intention and desire develops in early childhood. Gestures and object-directed actions have also been studied in connexion with the development of the understanding of intention. The development of the ability to use gestures and object-directed actions in social situations has been studied from numerous perspectives, including the embodiment perspective and the social-cognitive perspective.

Gestures and object-directed intentions

Gestures are often recognized as a tool indicative of higher social reasoning. In order to engage in or understand a gesture, an individual has to recognize it as an indicator of an object or event separate from the self or the actor. It is thought that pointing, especially declarative pointing (i.e. pointing intended to direct and share intention rather than request an object), reveals the understanding of others as attentional and intentional agents (e.g. Liszkowski, Carpenter, & Tomasello, 2007^[16]). This understanding is indicated by object-directed reactions to pointing (rather than focusing on the hand).^[17] Pointing is also thought to denote perspective-taking ability and understanding of intention, as the individual must be able to understand that the actor is attending to the object and, perhaps most importantly, that the actor is attempting to communicate information regarding the referent.^[17] The development of pointing is thought to reach a critical stage at around 9 to 12 months in normally developing children (e.g. Leung & Rheingold, 1981; Moll & Tomasello, 2007; Schaffer, 2005^{[18][19][20]}). Liszkowski and colleagues (2004)^[21] found that human children begin to point at around one year of age and do so with a multiple motives, including sharing attention and interest.^[21] Earlier pointing may be different in nature and is thought to develop from a learned association between reaching and adult responsiveness to the child's desire for a referent object.^[22]

Thus, it seems pointing may be more complex than a straightforward indicator of social understanding. Early pointing may not indicate an understanding of intention; rather it may indicate an association between the gesture and interesting objects or events.^{[23][24][25]} However, an understanding of intention may develop as the child develops a theory of mind and begins to use pointing to convey meaning about referents in the world.

Embodiment perspective

The embodiment hypothesis holds that cognition arises out of an individual's physical interactions with the environment. In this way, environment and behavior are an integral part of cognition and what psychologists conceive of as 'mental representations' are indistinguishable from perception and action (e.g. Smith, 2005^[26]). The ontogenetic development of social cognition may be thought of as intertwined with the development pointing actions. According to this perspective, gestures are not just indicators of development but play a key role in how children come to develop advanced social cognition, including understanding of object-directed relations and human intention. In particular, engaging in physical actions oneself may provide insight into the structure of another's actions (eventually leading to a more nuanced understanding of another's mind).^{[14][23]}

One method of determining developmental relations between actions and an understanding of social nuances behind actions is to assess correlations between infants' reactions to actions and the frequency with which infants produce actions.^[27] Children are generally able to produce actions around the same time they are considered to be capable of understanding the actions in others. For instance, Woodward and Guajardo (2002)^[17] found a correlation between children's ability to produce points (either during the experience or based on parental report of pointing at home) and their understanding of object-directed pointing (as evidenced by a preference for looking at a new object rather than a new hand path in a habituation paradigm) by 12 months. In addition, Brune and Woodward (2007)^[28] found that infants who produce object-directed points tended to have an understanding of pointing and infants who engaged in shared attention tended to have an understanding of eye gaze. Although the findings are correlational, they support the idea that actions may facilitate cognitive understanding. It is unclear whether self-produced pointing gestures causally influence an understanding of pointing as relational; however, there is experimental evidence which suggests that infants supported in a new action skill will subsequently develop an understanding of that action.^[27] For instance, infants allowed to grasp objects with Velcro mittens gained an understanding of object-directed grasping.^[29]

Social-cultural perspective

A social-cultural perspective includes the notion that not just actions, but partaking in social interactions and cooperation (both observing and acting) are key to both ontogenetic social development and responsible for larger cultural institutions, symbol systems, and other human social abilities (e.g. Moll & Tomasello, 2007; Tomasello et al., 2005^{[19][30]}).

This social-cultural perspective is derived from the Vygotskian view that higher cognitive functions originate in relations between individuals. The strict version of this view is that these functions are social actions that have been internalized.^[31] Pointing, according to Vygotsky, starts out as an attempt to grab a desired object. Then, a transitional gesture develops in which the individual reaches toward the object when it is desired as a cue to another to retrieve it. This transitional gesture, says Vygotsky, is an important step toward language in that participation in these social interactions are internalized and become an understanding of the psychological functions of others. Thus, pointing is an example of the internalization process that occurs over a long series of developmental events. These gestures help children to gain an understanding of triadic interactions, as the gestures go from being simply about the objects to being specifically directed at people and conveying intention toward others.^[31]

Tomasello and colleagues proposed a social-cultural perspective for understanding human affinity for advanced social cognition (e.g. Moll & Tomasello, 2007; Tomasello et al., 2005^{[19][30]}). This view takes from Vygotsky's theory the idea that social interactions (such as pointing) are not just indicative of higher cognitive functions, such as understanding intention, but play an important role in shaping them. They argue that advanced cognitive abilities are derived from the tendency to cooperate and engage in collaborative activities (e.g. Moll & Tomasello, 2007; Tomasello et al., 2005^{[19][30]}).

It was originally suspected that such foundational cognitive skills leading to advanced social understanding lie in the human ability to understand another's intention. Humans seem to have an affinity for figuring out what others are perceiving, intending, desiring, believing, etc. For example, the use of symbols requires the ability to understand another's action and attention on an entity in the world.^[32] However, understanding intentions is unlikely to be a species-specific ability.^[30]

Tomasello and colleagues argue that it is possible to break down the advanced understanding of shared intentionality into two developmental pathways that eventually become intertwined:

1. The ability to understand others as goal-directed and intentional agents and
2. A species-unique tendency to share emotions, events, and activities. Other species, such as great apes, understand the basics of intentionality; however, they do not exhibit behavior that suggests a willingness to engage in shared attention.^[30]

This claim may be further investigated by examining the functional origins of pointing. It is possible that the pointing exhibited by other species is different in purpose and origin from the pointing said to be indicative of a developing psychological understanding.^[33] The former, referred to as imperative pointing, was originally described by Vygotsky (1978)^[31] as pointing which begins in an attempt to reach for a desired object. When another retrieves the desired object, the individual learns to associate the gesture (typically hand and all fingers extended outward) with a communicated intention to acquire the desired object. However, research suggests not all points develop in this way. A study by Bates, Camaioni and Volterra (1975)^[34] distinguished between imperative and declarative gestures. Imperative gestures were described as those directed at an adult in order to obtain an object, while declarative gestures were those simply intended to obtain adult attention. Both types of gestures are social in nature; however, declarative pointing is thought to be linked to more advanced social understanding.^{[35][36]} Declarative gestures may involve more complex social and cooperative skills, linked to the development of communication skills (e.g. Liszkowski et al., 2005^[37]). For instance, Camaioni and colleagues found that declarative pointing was related to an understanding of adult's intentions, while imperative gestures were not related.^[38]

According to a social-cultural perspective, it is not the actions of pointing themselves, but the tendency to engage in cooperative actions (as indicated by elements such as shared intentionality and declarative pointing) that determines the advanced social-cognitive status of normally developing humans. These cooperative actions reveal an understanding of intention and may be for the sole purpose of interacting or cooperating rather than achieving an end. It may be that declarative pointing (typically exhibited by normally developing children but not children with autism), rather than imperative pointing, is indicative of the tendency to engage in the cooperative

interactions believed to be important for developing advanced social-cognitive understanding. This fits in with Tomasello and colleagues' conception that triadic social interactions in which child and adult engage in cooperative actions with shared intention are not only indicative of advanced social-cognitive ability but critical to the development of it.^{[19][30]} During these interactions, children gradually begin to conceptualize both first- and third-person perspectives, gaining a "bird's eye view" of social interactions.^[19] Both the embodiment and social cultural perspectives share the principle that gestures are not just indicators of development, but play an important role in how children come to understand object-directed relations and human intention.

Gaze and attentional acts

Research suggests that faces are pivotal in offering social cues necessary for children's cognitive, language, and social development. These cues may offer information on another's emotional state,^{[39][40]} focus of attention,^[41] and potential intentions^{[42][43]} (For a discussion see Mosconi, Mack, McCarthy, & Pelphrey, 2005^[44]).

Intention may be ascribed to an individual based on where in space that individual is attending. Intention is understood not only through actions and the manipulation of objects, but by tracking eye movements.^[13] Research in this area is focused on how humans develop the understanding that eye gaze indicates that the observer may be psychologically connected to the referent.^[13]

Even as infants, humans are able to follow the gaze of others. Further research has aimed to test whether infants are simply inclined to look in the direction of head movements, without any real understanding of another individual's psychological state.^[13] Brooks (1999) found that children do not direct attention simply toward the visual hemisphere of novel head movements; rather, children as young as 15 months attend to object-directed eye gaze, suggesting that children are attending to referents to which others attend, and are not simply gazing in a similar direction.^[45] These results support the idea that infants understand eye gaze as an indicator of another individual's psychological state, which is a basic component of understanding that others may have intentions separate from one's own.

Biological motion and inferring intention

Neuroimaging research suggests that biological motion is processed differently from other types of motion. Biological motion is processed as a category in which individuals are able to infer intention.^[46] An evolutionary perspective of this phenomenon is that humans survived on the basis of being able to predict the internal mental states and potential future actions of others. Research on biological motion has found cells in the primate superior temporal polysensory area (STP) that respond specifically to biological motion.^[47] In addition, there are brain regions, including the superior temporal sulcus, that respond to biological but not non-biological motion.^{[48][49]} These findings suggest that humans may have a biologically-based affinity for spotting and interpreting purposeful, biological motions.

In one experiment, 18-month-olds observed either a human or a mechanical arm attempting to perform actions, but failing to achieve a goal. The children imitated the action to complete the intended goal when the arm was human, but not when it was mechanical. This suggests that from a young age, humans are able to infer intention specifically as a biological mechanism between motions and goals.^[50]

Humans have a tendency to infer intention from motion, even in the absence of other distinguishing features (e.g. body shape, emotional expression). This was demonstrated in a study by Heider and Simmel;^[51] they had observers view videos of moving triangles, and found that participants tended to attribute intentions and even personality traits to the shapes based on their movements. The movement had to be animate, meaning self-propelled and non-linear.^[51]

Johansson^[52] devised a way to study biological motion without interference from other characteristics of humans such as body shape, or emotional expression. He attached dots of light to actors' joints and recorded the movements in a dark environment, so that only the dots of light were visible. The Johansson figures, as they came to be known, have been used to demonstrate that individuals attribute mental states, such as desires and intentions to movements, that are otherwise disconnected from context.^[46]

Simulation theory

The simulation hypothesis holds that in order to understand intention in others, individuals must observe an action, and then infer the actor's intentions by estimating what their own actions and intentions might be in the situation.^[46] Individuals connect their own actions to internal mental states through the experience of sensory information when movements are carried out; this sensory information is stored and connected to one's own intentions. Since internal mental states, such as intention, cannot be understood directly through observing movements, it is hypothesized that these internal states are inferred based on one's own stored representations of those movements.^[46]

This theory is supported by research on mirror neurons, or neural regions, including the premotor cortex, and parietal cortex, that activate both when individuals are engaging in an action, and when they are observing the actions of others. This suggests individuals may be simulating the motor movements via internal representations of their own motor movements.^{[53][54]} Thus, research indicates that humans are hard-wired to notice biological motion, infer intention, and use previous mental representations to predict future actions of others.

Intentions and behaviors

Although human behavior is extremely complex and still remains unpredictable, psychologists are trying to understand the influential factors in the process of forming intentions and performing actions. The theories of Reasoned Action and Planned Behavior are comprehensive theories that specify a limited number of psychological variables that can influence behavior, namely (a) intention; (b) attitude toward the behavior; (c) subjective norm; (d) perceived behavioral control; and (e) behavioral, normative and control beliefs.^[55] In the theory of reasoned action, intention is influenced by people's attitude toward performing the behavior and the subjective norm. However, the level of perceived control is believed to be influential on people's behavioral intention along with their attitude and subjective norms, according to the theory of planned behavior. Not surprisingly, in most studies, intention is driven by attitudes to a greater extent than by subjective norms.^[56]

The predictive validity of the theory of Reasoned Action has been examined in numerous studies that have previously served as literature for at least three quantitative reviews. Ajzen and Fishbein (1973) reviewed 10 studies and reported a .63 average correlation for the prediction of behavior from intentions and a mean multiple correlation of .76 for the equation predicting intentions from both attitudes and norms.^[57] With similar objectives but larger samples, Sheppard et al.'s and van den Putte's meta-analyses estimated correlations of .53 and .62 for the prediction of behavior and multiple correlations of .66 and .68, respectively, for the prediction of intentions.^{[58][59]} All these studies have reflected the strong correlation that exists between people's attitudes, social norms and their intentions, as well as between their intention and the prediction of their behaviors. However, these correlations do not remain unchanged across all the conditions in people's life. Although people are likely to develop intentions to perform the action in question if they have a favorable attitude and perceive the behavior as controllable, then people's perception of control would be irrelevant to intentions when people have negative attitudes and perceive normative pressure not to perform certain actions.^[56] Research has also shown that people are more likely to perform an action if they have previously formed the corresponding intentions. Their intentions to perform the action appear to derive from attitudes, subjective norms, and perceived behavioral control.^[60] For instance, the reason you are motivated to have a few drinks after work is mostly determined by several factors. The very first one is your intention. Whether you have a positive attitude towards drinking as it can help you relieve stress and enjoy your time can greatly influence your attitude towards drinking after work. The next factor is the subjective norms

around you. The level of intention to drink after work you are most likely to develop is influenced by whether significant people around you also hold favorable attitudes towards drinking and whether society tends to reward people who can drink. The last factor is the level of perceived behavioral control you have towards your intended behavior, more specifically how much confidence you have in controlling how much you will drink. If all of these factors tend to enhance your intention to have some drinks after work, you are more likely to do so. The longer you maintain the behavior of drinking after work, the stronger and more consistent your original intention will become. As a result, the greater the likelihood you will have some drinks in the future.

How people think about and verbally communicate their own intentions also impacts these intentions. For example, asking a question about prior behaviors using the imperfective aspect of language seems to be able to bring out stronger intentions to perform such a behavior in the future.^[61] According to the *World Atlas of Language Structures*, "Imperfective Aspects" refers to a specific form of language structure used for reference to the present and the future but also for ongoing and habitual events in the past. For example, 'He writes/is writing/wrote/was writing/will write letters.'^[62] People are more likely to interpret the event as ongoing, and likely to resume the action in the future when it has been described with the imperfective verb aspect.^[63] Similarly, using present tense to describe an action as ongoing may strengthen intentions to perform the same action in the future.^[64] Previous research has showed that both information on past behavior and their attitude towards such behavior play crucial roles in predicting people's future behavioral tendency.^{[65][66]} Recent research done by Carrera and others concluded that verb tense may not have direct influence on intentions, however it could still affect the type of information used as a basis of behavioral intentions. When participants described a past episode using the present tense, they consistently used the more concrete past behavior as a basis for their intentions. In contrast, when participants described a past episode using the past tense, they consistently used the more abstract attitude as a basis for their intentions.^[67]

See also

- Collective intentionality
- Entention
- Intention (criminal law)
- Intentional stance
- Intentionality
- Intentions (disambiguation)
- Motivation
- Scienter
- Telos (philosophy)

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