

A plea for mental acts¹

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Joëlle Proust
CNRS, CREA
Ecole Polytechnique, Paris

Traditional philosophers have explored the view that judging could be an act of the will, influenced in part by a former act of willful attention selecting those aspects of the matter to be used as premisses. Conceiving, imagining, willing, planning, reasoning, dreaming, as well as desiring, have been also taken to belong to the extension of mental acts. This proliferation calls for some clarification. What are the conditions that should be taken as constitutive of a mental act ? Among the mental processes quoted above, only a subset can be clearly categorized as doings; others seem to be uncontrolled mental happenings, while still others seem to belong to one or the other class depending on circumstances. The goal of this paper is twofold. The first is to offer a definition of a mental act, that could help individuate a natural class of processes (with a common set of properties) across various mental functions. This wide-ranging definition will in turn clarify the notion of self-monitoring, and some important issues related to the acquisition of a theory of mind. The second is to defend the explanatory role of mental acts against two objections. One is Gilbert Ryle's contention that postulating mental acts leads to infinite regress. The other is a different although related difficulty, which I will name the *access puzzle* : How can the mind already know how to act in order to reach some desirable result ? I will show that a definition of a mental act which includes a proper analysis of the concept of a mental operation is able to overcome both difficulties while preserving its domain of application. We will therefore have to proceed by steps : a first attempt at defining mental acts will be made. Examining the difficulties will lead to a more detailed and hopefully more adequate analysis.

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A - What is a mental act : first attempt at a definition

In standard theories of action such as Davidson's, action in general involves (a) having a proattitude toward a certain result or state of affairs that is believed to be within reach, and (b) believing that there is some particular behavior that will help to accomplish it. According to Davidson, the proattitude and the corresponding belief constitute the reason to act which in turn causes the action.

Theories of action can be contrasted on the basis of their underlying concept of an event : if an event is to be an instantiated property (in space and time), then a single movement allows performing many actions at the same time (as defended by Goldman, 1970) : Gavrilo Princip contracts his index, pulls the trigger, shoots the gun, kills Pierre de Serbie, starts the First World War, ruins Paul's grand father. For simplicity, Davidson's extensional view of events will rather be adopted here : an event is some connected spatio-temporal region that has causally relevant bounds. For Davidson, all the preceding descriptions hold of a single action, and a single event : contracting his index; by contracting his index, everything else causally followed in a chain of related events. (1980, 56). The particular event constituting the basic action can thus be described with the help of whatever consequences it did have, although as an event it does not coincide with its causal effects (Davidson, 1980, 58). A *basic* description in this scheme is one which resists another explanation in terms of 'by' : he shoot the gun by pulling the trigger by contracting his index : but there is nothing else that he did in order to contract his index². Of course, some neurophysiological event happened in his motor cortex when he contracted his index, but this event is not under his direct control and forms no part in his intention to act. Now how can one specify this well-known analysis of intentional action to apply it to mental action ?

First how should mental be generally understood ? By mental, will be meant here the property of being part of a representational process. Assuming that physicalism is true, there will be brain states subserving such a representational process. Let us note that an ordinary action might be called mental insofar as it is caused by mental attitudes. But in the general case, the result of an action is some change in the external world obtained through the use of various tools or other physical means (including verbal ones) : I acted to paint a wall, to cast my ballot, to win the elections. As Searle puts it, an action has a mind-to-world direction of fit (Searle, 1983). To make an action strictly mental, one might think of two additional

² On basic acts, see Hurley (1998), 357.

conditions: The *goal* of an action might be confined to some mental-representational property, and further, the *instrument* of an action (the relation *by*) might be restricted to mental/cerebral activities.

As a matter of fact, the two conditions are *independent from each other*. You might have a physical goal and use only mental means (you could try to kill or cure someone by manipulating her beliefs). You might have a mental goal and use physical means (e.g. try to make someone love you by putting some love potion in her glass ; or as Pascal recommends, you can kneel down and pray in order to induce religious faith in yourself).

As I will use the term, a mental act is defined on the basis of its goal, which has to do with mental events, mental states or mental dispositions. I will leave it open whether instruments should be kept mental, or should be extended to various cognitive aids, such as computers, paper and pen, etc. My definition of mental acts will thus supplement the general definition of an action with the conditions (i) and (ii) :

i) the intentional content of a mental action is [that particular mental events, mental states or mental dispositions obtain as a causal consequence of the corresponding belief and desire].

ii) the mental events, mental states or mental dispositions to be obtained belong to the very subject who forms the corresponding intention.

Condition (i) specifies the range of intentional contents that qualify an act as mental. Condition (ii) further restricts the extension of mental acts to "self-directed" acts. This determination of the natural range of mental acts by (ii) could be questioned. Why should one not rather offer a more general theory, treating both self- and other-directed mental acts ? There are two reasons to treat self-directed mental acts as the relevant category. First, self-directed mental acts play a key role in psychological explanation at the individual level. Even if one acknowledges the crucial importance of others in individual skill acquisition and social learning, the kind of goal-directed activity that occurs in the mind of a person who needs to achieve some mental property -- in the field sometimes called loosely "metacognition" -- needs to be understood independently. A second reason is linked to the empirical fact that a strictly mental act, taken in the restricted sense expressed above, cannot in normal circumstances, have any direct effects on others.

Another worry might arise about condition (ii), as to *how self-conscious* the subject should be when executing a mental action : should condition (ii) be taken to require that the subject know that one of *his own* future states is the target of his/her mental act ; should it have among its conditions of satisfaction that it should be executed by the *subject with the awareness that he/she act on him/herself*. ? An appropriate answer to this worry cannot be given at this early stage of our attempt

at defining mental acts. We will have to assume that the notion of self does not need to be explicitly represented by the acting subject for him to perform a mental act. What is needed is that the subject can, using description or deixis, represent intentions for securing some definite mental property, and also figure out, at least in a pragmatic way, that he has specific means to reach it.

Varieties of mental acts

The definition above contrasts mental properties that cannot normally be willingly obtained³, such as dream contents, with those that can be made an object of the will, such as paying attention. Most terms for mental processes and activities cut across this distinction. For example, hearing, seeing, touching, sensing, tasting, smelling can either be the result of an automatic processing in which the subject's intention does not play any role, or result from an intentional orientation, i.e. an active effort involving, more or less, learning and skill. Perceiving attentively needs a particularly careful analysis, as it constitutes the basic kind of mental act. Before we turn to it, let us note that we can list the verbs which express mental acts by using the common procedure known as "the try test". To determine whether some piece of behavior qualifies as an action, i.e. a controlled movement having some intentional content, just consider whether it can meaningfully be tried. As a result of the test, it is obvious that one can try to walk, but, for example, not to faint (one can try to pretend that one faints, or one can try to absorb a poison that will make you faint). As is clear from the latter example, the "try test" is not completely tight. A subject may use indirect means to reach a state that is normally out of his control. Moreover, a subject may believe wrongly that he can try to deliberately reach some state which is in fact beyond his control. Therefore people can try -- unsuccessfully -- to do all kinds of things, which might not qualify as actions. Using the "try test" implies a decision as to which tryings are doomed, and which are promising. Restricting the "try test" to mundane examples, we come up with a few uncontroversial cases : (1) One can try to recall (a date, the circumstances of a battle, a proper name) ; this kind of mental act is usually named *directed recall* ; try to read a mental map, (2) try to understand (a sentence, a line of reasoning, an emotionally difficult situation), (3) try to control motor output (try to follow a rule, try not to show anger --or any emotion--; try to be pleasant or helpful, try not to procrastinate, or try to commit oneself to a given project (4) try to concoct a plan (try to escape,

³ The class of properties, both physical and mental, which can be made the content of intentions, is not completely determined ; see the discussion of changes obtained through biofeedback in Hurley (1998), 355 sq.

try to win a game of chess), (5) try to acquire a skill (learning). More controversially, one can (6) try to like something (try to enjoy Sushi, try to like Wagner, try not to get bored by minimalist painting). One can try (7) to form intentions or desires of a certain, desirable kind (on the basis of second order intentions⁴) Although it is more controversial, one can try (8) to believe, and even (9) to ignore. All these various cases belong roughly to three categories of mental actions : those that involve optimizing reliability (1,2), those that aim at the satisfaction of internal needs (efficiency : 4,5, pleasure : 6,7), and finally those that subserve more or less directly a function of social coordination (3,6,7,8,9).

In each case, it seems that mental acts involve *optimizing* or *redirecting* to new targets operations that happen otherwise automatically and without special self-guidance, self-instruction or self-monitoring.

Attention as a mental act

There are several features of attention that are in favor of taking it to be a type of mental act. It is clear that listening, in contrast to hearing, is a *doing*. Listening does not involve only exposition to some external fact, but a voluntary orientation to the information delivered by perception. Such an orientation involves two major types of behaviors : one type is mainly physical, and consists in turning one's head, freezing, "concentrating" as one says on the signal of interest, all things that could be described functionally as an attempt to improve physically (by bodily posture) the signal-to-noise ratio. The second type is blocking other possible goal-directed behaviors : disregarding other perceptual events, (ignoring distractors), stopping one's current activity, etc. This aspect of attentional behavior could be described functionally as an attempt to improve mentally (by mental activation) the signal-to-noise ratio. *The crucial fact in this respect is that division of mental effort generally leads to an elevation of internal noise. Whether the subject has a theoretical or a practical grasp on that fact, he turns out to be able to use this practical knowledge, as part of his knowing how to behave in an optimal way.* Any human being knows how to improve his perception by monitoring his action appropriately. This knowledge grounds the contrast between the mere stimulation and the use of sense-organs⁵ (Armstrong, 1968).

Following Brand (1984), I will call all these types of mental processes "selective focusing on a certain property". Among them, attention is the best understood. It is widely acknowledged that attention allows one to stabilize perception and extract the signal in a way that could not have been achieved without this active contribution. Therefore we might say that the corresponding mental act has the end

⁴See Frankfurt, (1988).

⁵ See Armstrong, (1968), 215.

result of perceiving the sound with the degree of clarity required by current needs, and that nothing else could have accomplished normally the same kind of result.

How does "perceptual selective focusing" do on the "try" test? In normal cases, one does not try to perceive, for example, a house or a face. It is only when it is difficult to hear or see a signal, either because the sensory receptors are damaged, or because the external conditions are noisy or performance is hurried, that it makes sense to say that one tries to perceive. In such a case, securing the perception of a particular signal requires an active orientation of the perceiver, as well as an active suppression of all competitors in the sensory content of experience, which is what so-called *selective attention* amounts to. As we saw earlier, an interesting feature of trying is that it may or may not achieve the content of the intention which governs the trying. I may prick up my ears and still hear nothing. Nevertheless, there is something that I do, even though I do not hear any better as a consequence of my trying. I orient my body and "my mind" to some anticipated event as a consequence of my expectancy (note that expectancy covers both a belief and a desire).

B - Objections to mental acts

Although mental acts are rarely, if ever, questioned in their general structure, some typical examples of mental act candidates have been claimed to entail conceptual difficulties, suggesting that the very idea of positing mental acts might be confused. Among the mental acts that have been subject to critical examination, the examples of attention and volition are prominent. Attention is a case where a specific occurrent perception, action or belief is selected for a more careful or accurate handling. Volition is sometimes taken to be a specific act of willing - distinct from intention - through which a bodily part is exerted⁶. We do not have to commit ourselves at this point to the existence of a specific kind of mental act, in particular to the existence of volitions. But we will rather examine the general arguments underlying these objections.

1- The infinite regress objection

In the background of his well-known anticognitivist strategy, Ryle insists that heeding is not primarily or essentially a *cognitive* concept. Against the idea that there would be a particular act consisting in heeding, he uses the threat of an infinite regress⁷:

⁶ See Ginet (1990), 23 sq.

⁷ Earlier in his book, Ryle also directs this objection against the recognition of volition as a distinct mental operation causing voluntary movement (p. 67).

"So far from heeding being a sort of inspecting or monitoring, inspecting and monitoring are themselves special exercises of heed (..) Doing something with heed does not consist in coupling an executive performance with a piece of theorising, investigating, scrutinizing or "cognising" ; or else doing anything with heed would involve doing an infinite number of things with heed" (Ryle, 1949, 137).

This argument is quite close from the other objection he raises against volition:

"So what of volitions themselves ? Are they voluntary or involuntary acts of mind ? Clearly either answer leads to absurdities. If I cannot help willing to pull the trigger, it would be absurd to describe my pulling as "voluntary". But if my volition to pull the trigger is voluntary, in the sense assumed by the theory, then it must issue from a prior volition and that from another *ad infinitum*." "(Ryle, 1949, 67)

Ryle suggests that heed is best expressed as an adverb modifying a verb : carefully, attentively, etc. He considers two different ways in which one could characterize the contribution of the adverb to the act so characterized. Either we say that the adverb describes some "hidden concomitant of the operation to which it is ascribed"; or we say that "it is some merely dispositional property of the agent" (Ryle, 1949, p. 139).

Both ways of addressing the difficulty, according to Ryle, are bound to fail. The first type of explanation has to be rejected because accepting it "would be to relapse into the two-worlds legend". That this is so is a consequence of an implicit claim, that the adverb adds a property such as awareness to a bodily operation. Now admitting that awareness plays a particular role in heeding, over and above the first-order activity that it accompanies, seems to make the admission of a dualist, mind-body causal regime inevitable. His second reason for rejecting it is the observation that attention is parasitic on something else : if there are two things being done simultaneously, why is it that I can't pay attention without doing something else ? One can very well issue a request without asking a question, and ask a question without requesting anything. But one cannot attend to something without doing something else. One cannot purely attend ; one can attend to what somebody is saying, one can look attentively, read studiously, etc. One could say that *attending is parasitic on the existence of some other activity, mental or physical*.

Now, as Ryle bars the option of heed as a separate act concomitant to the operation it qualifies, he is left with the dispositional view. If attention is understood as a disposition, it is a permanent property which can be expressed in certain favorable conditions, but still is unchangeable and not subject to degrees

with the passing of time⁸. So if attending is understood in this way, we should be able to say both that a person is able to attend, and that she does so presently (without further precision), which is obviously not the case. This dispositional view thus fares no better than the separate act view with the fact that attention is essentially linked to some particular activity. Ryle suggests various ways to make the dispositional view more acceptable, but he admits failing to come up with a sufficient condition which would single out attention from other dispositions⁹. Ryle's objection is a serious one. A philosopher who analyses attention as a particular act - rather than as a disposition - as well as a partisan of mental acts in general, have the duty to show how the infinite regress objection might be overcome.

B - The puzzle of attention : the access puzzle.

The friend of mental acts has a second difficulty to confront. To explain it, I will take the example of attention, but the same puzzle affects all the various kinds of mental acts. Every psychologist takes attention to be an active process of selection "of one out of what seem several simultaneously possible objects or trains of thought" (James, 1890, vol. I, 404). This quotation stresses two important features of attention.

First, attention, as well as the other mental acts, operates through *selection*. For William James, as in folk psychology, this kind of selection is reached in a deliberate way. Attention is essentially active, or, in contemporary terms, it is an *endogenous* mechanism. One occasionally speaks however of a kind of attention that is "automatically" captured. You can notice a noise because it is so loud that you cannot fail to notice it : attentional capture is *automatic*., in contrast to the kind of latitude of choice that is open to selective attention. Automatic attention, an exogeneous mechanism, is *not* genuine attention, but it is related to it in some crucial way, that has to be made explicit.

Second, attention operates, according to James, both on external objects or states of affairs and on "trains of thought". This duality, again, has to be explained. How is it that we have an activity that can take all these various contents : listening to a bird

⁸Habits, skills, fashions, beliefs, are dispositions whereas buying, screaming, running are events (or "episodes") : Ryle, (1949, 116).

⁹Ryle considers that attention could be articulated by a condition such as *preparedness* ("being prepared to satisfy some subsequent tests" (p. 139).) But this condition is, he recognizes, by no means sufficient to characterize attention, as can be seen with other dispositional words with the same preparedness flavor : dying, immunised, for example. Ryle then adds a counterfactual dimension to attending : " Being in that frame of mind, he *would* do the thing he did, as well as, if required, lots of other things none of which is he stated to have done". (141) But this analysis loses the psychological character of attention as a selective focussing.

song, concentrating on the French Revolution, wanting not to forget the doctor's appointment, scrutinizing one's emotions ?

But this is not the puzzle. Here it is : how can you come to attend to something *before* you have perceived or isolated the relevant content ? And if you already have, why should you spend time and energy doing the same thing again ? How can you filter out what you believe to be irrelevant as long as you don't know what your perceptual content is ? How can you make yourself conscious of something you are not yet conscious of ?

Just as is the case for the infinite regress, this "access" puzzle seems to be, in one form or another, present in all kinds of mental acts¹⁰. For example, if we act on ourselves to believe, we seem to contradict the very notion of a belief as a thing "which we, as it were, found we had", in Williams' terms.¹¹ If we act on ourselves to retrieve a memory, how can we know that we will succeed at recuperating a lost name that presently escapes us ? How can we want to form a desire if we don't have yet the corresponding desire ? etc. The particular form it takes in attention is the following : how can I set myself to perceive some external or internal property, if I don't have yet any cognitive representation of it ?

What distinguishes this puzzle from Ryle's infinite regress, is that in the puzzle, the content of attention seems to be a precondition for accessing it, whereas in Ryle's objection, the act of attention itself requires a previous act. Performing such an act supposes that you have already performed it (as an act-token) (access puzzle) or that some previous act of the same type was performed (Ryle's puzzle).

Is there a way of releasing a theory of mental acts from the two threats of Ryle's infinite regress and from the access puzzle ? Such an investigation is well worth it, for it requires an explanation of basic endogeneous mental dynamics in terms that makes no allegiance to any homunculus, supervisory self or other ghost in the machine.

¹⁰ This problem should be distinguished from the kind of difficulty associated to what Susan Hurley (1998, ch.2) calls "the myth of the giving". The latter problem arises in transcendental accounts where agency - or "spontaneity" - is given a role in determining unity of consciousness and making mental content possible. Granted that a coherent sense of agency presupposes the possibility of intentions, which themselves presuppose content, Hurley shows that a regress opens up in grounding content on spontaneity of understanding or in agency conceived in personal terms. In the access puzzle, the problem is not of how action could in general deliver content without presupposing it as a matter of principle, but of how a token of active search of information could be directed by an element to which no informational connection seems available. The present paper does not aim at producing a foundational, transcendental or reductionist account of the relations between agency, consciousness and informational content ; although the author holds the view that a naturalistic account of intentionality is available or at least within reach (Proust, 1997), this claim is independent from the specific difficulty involved in the access puzzle (although not independent from the kind of solution offered to it).

¹¹ Williams (1973), p. 147.

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C - Mental acts and mental operations

One key consideration for solving the two associated difficulties consists in understanding what makes a mental process *controlled* rather than *automatic*. As we noted earlier, in mental action, a thinker controls his own mental activity in order to allow a certain mental property to be instantiated. This way of talking is inadequate, because it presupposes that the agent is using his mind as a tool -- which is the very difficulty into which we are entangled -, and fails to explain how the mind can be simultaneously the agent and the tool of the same action. A more cautious way of expressing this view is to claim that a mental action is one that exercises control on antecedently uncontrolled mental processing in order to modify the cognitive properties that are the output of that mental processing. Empirical theorizing on controlled processes indicates that controlled processing occurs when the mind has to adjust to changing conditions, whereas automatic processing is linked to a consistent and durable mapping between stimuli and responses (Schneider & al. ,1984). A new activity requires control, and will keep requiring it if the input varies from one trial to the next (where stimuli and responses are "variably mapped"). A set of contrasting properties help distinguish the two kinds of processing. Controlled processing requires conscious awareness of the task (the content of working memory is conscious) ; it competes for resources with other types of current processing, and is driven by more or less specific goals. Automatic processing, on the other hand, is effortless, non conscious and tends to become unintentional. (Schneider et al., 1984, 1-2).

Most mental attitudes appear to be automatic and effortless. One can perceive something without expecting it or choosing to perceive it; one can also entertain a memory which presents itself automatically in the conscious mind. One can also use implicit memories in one's own behavior without being aware of them (Kelley & Jacoby, 1993). Agency seems absent in all these mental activities, insofar as these operations do not require a deliberate intention to be carried out. The same hold for beliefs and desires. First-order belief, desire and recall, as well as judging or reasoning, are clearly not aiming to obtain a *particular* mental result. They are normal mental functions activated by specific stimuli, giving rise to adaptive changes in epistemic states (memory, categorisation, judgment, evaluation) ; but these latter states are the result of the normal exercise of the function, rather than the product of a specific contextual intention. Even in such high-level activities, the

mind normally processes external outputs and fixes them as new beliefs in an automatic way, until the processing reaches its endpoint. For this reason, they are not kinds of mental acts. To have a convenient term to cover all this automatic mental processing, by way of which a stimulus is memorized, categorised, triggers a motivational state, etc. , we will call them mental *operations*.

How then can an operation be defined? 1) Mental operations have an intentional content, and they have a determinate function, which means that they can be understood from the point of view of what they help achieving. Typically, an operation transforms an input into an output according to a certain type of mechanism in virtue of some functional regularity. For example, following some activity on the cochlea and in auditory cortex, as well as in neurons from the Broca area, one hears the word "Could you help me, please ? Or, following certain perceptual input and background beliefs, some new belief is being "fixed". But at no point has the thinking agent done anything else ; *no particular goal* , no antecedent intentional content, were entertained in those two operations. 2) They are also unintentional in the sense that they are caused to occur by the interplay of inputs with functional states, and in particular in the ongoing process of learning , i.e. perceptions, motivational states and other attitudes that are *under no current control*. Which is to say that, 3) *as operations*, they cannot be *deliberately* obtained. It could be suggested that 4) operations are non-conscious, whereas mental acts are; but it can be suspected that no such sharp division between conscious and unconscious processes can be offered at this level, and therefore this feature should rather not be included in a definition.

Most constituents of perceptual processing and learning belong to the class of mental operations. (the term "mental" allows restricting our inquiry only to those mechanisms used in processing which involve representational content, to the exclusion of, e.g., mechanisms for restoring basic level activation in neurons). Mental operations that are causal in learning are revealed through their effects on processing. For example, response priming occurs when the adapted response belongs to the same type as a sequence of antecedent response behaviors : the new response is "facilitated", i.e. performed more easily and rapidly. When a given type of stimulus is occurring repeatedly at the same location, there is also a spatial cueing effect, which facilitates detection and identification of events at the same place, etc¹².

¹²One way of exploring the relationship between a mental act and the underlying mental operations is to examine the particular act of directed ignoring (Zacks & Hasher, 1994). Inhibition is a subpersonal process that helps control working memory (another subpersonal mental function). It is responsible for the so-called negative priming effect, where a subject who has been instructed to ignore a stimulus in some task will later be delayed in responding to the same stimulus used as a target. Inhibitory processes have two major contributions to make to selective attention : they help screen out irrelevant stimuli, and they allow the focus of attention to switch in response to changes "either in goals or in the structure of information" (Zacks & Hasher, 1994, 244).

Although these mechanisms clearly have a function (they help an organism take advantage of regularities in the world), they cannot normally be controlled, at least not directly, by the agent. One should rather say that in those cases, the environment controls the perceiving organism. What the agent can do, however, is rely on them to achieve *something else*. A useful distinction offered by Jennifer Hornsby (1980) in the philosophy of action can be transposed to mental acts and help understand their connection to mental operations.

Hornsby contrasts *transitive* bodily movements, such as "he raised his arm", with *intransitive* bodily movements, such as "his arm raised". Only the former, she argues, may be the content of an action (his arm could be raised independently of his intention of raising it, for example in a Penfield-style brain surgery). There is a further important relation between transitive and intransitive bodily movements. An action involves a transitive movement, which in turn *causes* an intransitive one. As a consequence of his raising his arm, his arm raised.

The important question is to know what exactly can be the causal relation between a transitive and an intransitive movement. According to Von Wright, "By performing basic actions, we bring about earlier events in our nervous systems" (Von Wright, 1971, p.77). Hornsby corrects this point : the events in our nervous systems do not happen *earlier than* the corresponding actions ; they are caused, just like the intransitive movements, by the transitive action being performed (Hornsby, 1980, 22). According to Hornsby, the action of fist clenching *results in*, but does not *result from* a muscle contraction. "It is the fist's clenching alone (clenching I), not the action of fist clenchingT which follows on a muscular contraction I" (24).

This explanation may seem to defy naturalism, at least if one understands it as a claim that causal relevance belongs exclusively to the personal, agent-level where intentional transitive action develops as opposed to any particular mind-brain mechanism. But it is perfectly compatible with a naturalistic approach of action if one adopts a teleological account of action (Wright, 1976, Proust, 1999). In that etiological-historical framework, it makes perfect sense to say that an agent performed a muscle contractionI in the course of performing some actionT, and that the latter caused the former to happen. One could also say that some *type* of bodily movementI was recruited as an element of a motor sequence able to produce some target output (bodily movementT), which explains that a *token* of movementI was caused to occur in the course of actionT.

Now just as an intransitive movement can be caused by the corresponding transitive movement, some mental operation can be activated by the corresponding mental action. It does not turn the mental operation into an action. But the teleological nature of action explains how an agent can activate certain operations which have been previously responsible for reaching certain goals when she

entertains again the same goal. Learning causes the same operation to be activated in a mental action whenever a certain kind of intention arises, just as, in physical actions, a group of muscles is activated whenever a certain type of object has to be grasped.

Although the subject does not know what the necessary operations are and what they exactly do, she knows how to do things and she also knows that she relies on dedicated operations to achieve them (like remembering where the bookstore is located). Just as the subject walks without knowing anything about her motor system, she uses mental operations without knowing anything about her functional system. But she is somehow familiar with her memory capacity, her planning facility, her perceptual system, etc. Everyone is apt to, and even constantly busy at judging one's own performances in all the various parts of functional capacities which constitute a mind. One must be able to judge the adequacy of a particular response in order to correct it ("retrospective monitoring", Nelson & Narens, 1996), to evaluate one's capacity to adequately respond ("prospective monitoring"). One also needs to know whether something will be easy to learn, or some strategy should be used instead of another to make learning easiest ("ease of learning" judgments). One finally must be able to decide whether one will be in a subsequent test able to remember an item not currently recallable ("feeling of knowing" judgments) or presently available in memory ("judgments of learning"). The domain called *metacognition* provides to the mind the resources needed to launch controlled mental acts.

Now one can ask how it is at all possible that a mental act should control what seems inherently out of control, i.e. mental operations. To put the question differently, how is it possible to "use operations as means for other goals"? Or, in Ribot's words, "How can art constrain nature for its own sake?"

The mechanism of voluntary attention: take the natural motives, turn them away from their direct goals, use them (if possible) as means for other goals. Art constrains nature for its own sake. (Ribot, 1889, 53).

Ribot's answer is that the brain has acquired, in the course of evolution, an instrument for achieving such a result; it is a specific function, which is conscious, deliberate, flexible, context sensitive, resource consuming: *selective focusing*. The brain cannot invent free ways of doing things at will. But it can make its own functioning more efficient by priming those mental operations which are currently more useful than others. Now as we saw earlier, selective focusing is the prototype of a mental action. It can be willed, believed to be necessary (under some description), planned, tried, failed, regretted, recognized or denied, performed with brio or poorly, ordered or advised.

I will shortly spell out the conditions which jointly constitute performance of such a mental act type. Before that, the relation at the core of the notion of a mental act, namely the relation of a mental property being contingent on some other mental property, needs to be spelled out. This relation will be a major ingredient in our solution to the two paradoxes exposed above.

The relation of contingency between mental properties.

First, let us recall that mental properties are content properties. The content of a mental state has the form (X with F), where X is some external or internal object or event, and F is some dynamic, transitory or stable property of X. These contents do not have to have a propositional format or involve the use of concepts. Perceptual content as well as propositional attitude contents, will be considered as mental content.

One will say that an action is *contingent* on another action, or on a mental operation, when the former cannot be performed unless the other can, while the converse is not true. For example, one cannot switch on the light if one cannot move one's limbs ; similarly, one cannot direct one's perception to a property in some modality if one does not have the ability to perceive properties in that modality. By extension, one can say that one mental operation is contingent on another mental operation if the first can be executed only if the second is performed. Analogously, we will say that a mental property *I* is contingent on a mental property *J* if one cannot possess *I* without possessing *J*. Mental properties which are not contingent on any other mental property are *elementary*. Non elementary mental properties are said to be *derived*.

The definition given above of a mental property being contingent on another is ambiguous as to whether it is intended in a dispositional, a causal, or a mereological sense. i) Contingency can be understood in developmental terms: one cannot, for example, teach arithmetic to a child who has not reached a certain level in speaking and writing; or a theory of mind cannot be grasped by a child who does not master joint attention. A complex operation presupposes a mastery of the so-called *precursors* of the corresponding ability. Here *dispositions* are concerned. ii) Contingency can also be understood in a non-dispositional, but in more directly causal or functional terms : for example the paint cannot hold unless the surface is clean. One cannot remember "from the inside" what one did not observe. iii) Finally contingency can be understood as constituent or mereological contingency : you can't have a whole if you don't have the parts. You cannot run if you cannot walk. You cannot sing in tune if you cannot sing. In a way, this sense of contingency

generalizes the dispositional sense; it is the sense which will be relevant for our analysis.

Now let us remember Ryle's objection to mental acts. In one interpretation of his objection, performing a mental act would presuppose performing another mental act. In other words, each postulated mental act - whether volition or attention - would have to be contingent on some other mental act. Each attentional act should be made possible by a former heeding, each volitional act by a former volition *ad infinitum*. One way to block Ryle's objection is to show that attention, in virtue of its own structure, has to have *derived* properties, and not elementary ones, as its intentional content.

The puzzle of attention, on the other hand, was the following : how can I heed a property that I did not yet perceive ? And if I did perceive it, why is it that I need to pay attention to it ? When I pay attention to something, what is it that I acquire, if not the property that caught my attention in the first place ? And then, what is the benefit of paying attention ?

Now the solution, put in ordinary words, seems obvious. In what I will call a "basic act of attention", there are two parts. The first is a "passive", uncontrolled, *registering* of some content. This part includes constituents which are tokens of mental operations, like hearing my first name in a conversation at a cocktail party. The second is the active attempt at grasping some particular property *connected with* the content registered, i.e. some new mental property contingent on the former (for example, by way of some antecedent learning).

One could generalize this solution for the attention puzzle, and propose that the access-puzzle may also be solved in the same way. In a mental act, the proposal goes, intentional content necessarily has the following properties :

- 1) *The mental property that is the intentional object of a mental act does not coincide with any presently available mental property.*
- 2) *The mental property that is the intentional object of a mental act is contingent on (at least) another mental property that can be either elementary or derived.*

The first claim seems not very controversial. It instantiates the principle of rationality, requiring not to spend further resources for a benefit already gathered. The second claim is much more difficult to substantiate. It is worth trying to establish it, for it is the key to a solution of both puzzles. *The claim to be argued for is that attention is an act that brings something new relative to some former operation, but that it is brought about and made possible in part by the existence of such a former operation.*

I will first explain the second part of the second claim, by using the familiar examples. I can use my attention on the basis of a former expectancy : in that case, the mental property that I aim at acquiring (for example, perceiving the color of John's tie) is contingent on my expectancy (John wearing a tie, the color of which I need to know). *My expectancy causes my perception to be directed to that part of John's apparel.* In the case of an automatic capture of my vigilance, on the other hand, as in the cocktail party effect, when I hear my proper name and, as a result, turn my covert attention to the corresponding conversation, I act on the basis of a former mental operation which is non-voluntary, uncontrolled, and stimulus driven : my name just popped to my ears ; then, I orient my body or at least, my undivided attention to the conversation in order to know in which context my name was uttered. The link between the property which is the output of the mental operation of automatic auditory capture of my name and my doing something (orienting my attention covertly to the conversation of interest), is again causal, because hearing of my own name (on the background of my other beliefs and motivations) immediately activates my desire to know more about what is being said about me.

Now my task is not only to show that claim 2 holds in most mental actions, but that it holds necessarily. How can one show that ? There are two traditional ways to proceed. One consists in using evolutionary arguments, while the other consists in invoking developmental facts. Both ways will understand "contingency" in the dispositional sense. As an example of the first strategy, Théodule Ribot as we saw earlier, hypothesized that "art constrains nature for its own sake ". Initially, animals were equipped with reflex mechanisms, in particular of the kind named "interrupts" in A.I., like freezing. The animal automatically stops doing what he does currently when he hears some unfamiliar noise. Later in phylogeny, the animals acquire the capacity of obtaining at will the type of effect that was obtained initially as a result of a blind reflex. The idea is thus that as a disposition, attention was first an exogenous disposition, and then became an endogeneous one, by courtesy of evolutionary history.

The developmental story goes exactly parallel to the phylogenetic history, (with the possible, if controversial justification that ontogenesis recapitulates phylogenesis). Babies first experience the world passively; they later become able to reproduce useful effects, and thus to perform actions where they were only able at first to collect perceptions by stimulus-driven behaviors. They also simultaneously develop an ability to *inhibit* inappropriate behaviors.

These stories are certainly correct. They make it a point of empirical truth that this should be the case. Another suggestion would consist in using the "mereological" sense of contingency to make a stronger point. In all valid definitions for an action-

whether mental or physical-, an action is necessarily contingent on mental properties that may, but don't have to be, the result of some previous mental action, in the sense that the whole process of action has to *contain* mental operations. Mental operations are necessarily the basic constituents of mental actions, and even may be said to be their instrumental components, just as they are, along with their external counterparts, - bodily movements -, the instrumental components of physical action. As noted earlier, beliefs and desires, - which are, in Davidson's analysis, the constituents of a reason to act causing an action- , are indeed mental operations. Perceptual belief, for example, has had its content determined by some perception along with some relevant categorization, independently of any intention of the perceiver and outside of his control. Perceiving a bird song, recognizing this song as a black bird's, along with the desire of hearing more of it, and of learning the particular pattern of that bird song, may lead one to stop and listen for several minutes. The whole process includes many sub-mechanisms, such as auditory flow-analysis, response priming effect, episodic and semantic memory retrieval, motivational associations, working memory for short-term planning, long-term planning (including in turn reasoning, memory, evaluations) etc. If a subject did not have the practical mastery of these operations, she would be unable to determine mental goals selectively and maintain them active until successful achievement of the intention. Indeed, in the teleological analysis of action summarized above, to have a goal presupposes that some association between an identifiable process and a desired effect is already established. The set of established cycles of mental operation-mental effects builds up a kind of mental action repertory in which a subject can draw according to his/her present circumstances to control and reorient his/her own mental contents.

To summarize the preceding discussion, a clarification of the respective role of mental operations and mental intentions allows for the release of mental actions from the grip of the two paradoxes above. The following definition for a mental act shows how :

S accomplishes the mental act of A-ing that results in the property of [X having F] iff,

- 1) there exists at t some occurrent mental operation of type O in S with the content property [M having N] (S in operational state O that M with N).
- 2) S has at t an occurrent proattitude toward attaining some other mental property [X having F].
- 3) S knows how to acquire property [X having F] if there is O with [M having N].
- 4) S's proattitude and know how tend to cause S to acquire [X having F].

5) The causal link expressed in 4 is not deviant.

Indeed when one scrutinizes the constituents of an action as spelled out in 1 through 4, one finds operations everywhere, and nowhere is "an agent" or his "action" to be seen as a causal constituent. A mental action is just a particular way of having operations combined in order to let control emerge from their very combination. Therefore the effect-theories of attention are compatible with this definition.

In this definition, the constituents of "a reason to heed" are, as is usual for action, a proattitude toward a goal and a belief that something is the right thing to do to reach that goal ; the relevant belief, however, belongs to the practical rather than to the theoretical domain : it is a know-how which does not need to be conceptually grasped. The proattitude articulated in 2 is a motivational or conative component that may be rather loosely determined. For example, in the cocktail party case, the guest is interested in knowing what gossips are circulating about herself. She wants to listen in order to know, and she concentrates her attention in order to hear what is said. There is a variety of other behaviors that would also help her reach her goal, although none would present all the advantages offered by covert attention. Instead of claiming that she *believes* that an act of covert attention should be used to reach her goal, it may be suggested that she simply *knows how* to reach some mental property *by way of* (what is in fact) covert attention.

This use of know-how is meant to emphasize that a subject often uses his attentional competences without even recognizing in which particular way she proceeds. She just appreciates what she can do in a given situation, on the basis of former learning. As a result of a long sequence of antecedent analogous "mental" situations, the subject has acquired various mental routines allowing her to obtain a determinate mental property. In other terms, she "knows-how to set herself in a position to perceive (remember, enjoy etc.) something" according to various learnt rules.

How reflexive is an attentional act ?

A reason to avoid the vocabulary of "setting oneself to acquire a property" is that there does not need to be any explicit reflexivity in a mental action, despite the surface structure of the idea of "causing oneself to acquire a property". In his *Intending and Acting* (1984), Miles Brand suggests an analysis of selective

consideration as a type of mental action¹³. In the analysis he offers, listening to a conversation is "putting oneself in the position to listen". I will fully quote his definition for directing one's perception :

"Let us say that person S directed his perception to X's being F if : (i) S set himself to acquire the property of being in a position to perceive x's being F, and (ii) S's having set himself to acquire the property of being in a position to perceive x's being F caused his having perceived x and F." (Brand, 1984,110).

Now this account tells you nothing of the situation which prompted S to direct his perception to X with property F. Without any clue on the operation on which this directing is conditional, it becomes mysterious how S first wants to, then finally comes to perceive what she sets herself to perceive. This omission saves the trouble of making explicit the puzzle of wanting to acquire what is presently under no control.

But more to the point, this account explicitly brings reflexivity into the picture. Myles Brand insists that this selective considering involves a *de se* attitude. Richard desires *of himself* to be sun-tanned is not equivalent to Richard desires of Richard to be sun-tanned. "Of himself" indicates both that Richard's attitude is self-directed and that the subject "is cognizant" that this is the case (Brand, 1984, 101)¹⁴. "Himself" in "setting himself to perceive" is the same entity as the person who finally acquires the property of perceiving : he knows *of himself* that it is the case that he wants to perceive X and that he can act to perceive X.

This analysis is derived from Chisholm's explanation of what it is to perceive. "What one perceives, writes Chisholm, is not merely something red or something round, but that something red or something round stands in a certain relation to *oneself* ." (Chisholm, 1981, 95). According to Chisholm, the properties that are ascribed to things in perception are "self-presenting" in the sense that having them implies necessarily the capacity of recognizing that one has them (cf. p. 80). The word "I" has no speaker meaning. But it has an object, or a referent. The subject

¹³His analysis differs from the present one : he says that it is a thin action, "not intentional", and close to a "reflex action". But we don't need to take these divergences into account here.

¹⁴My account diverges from Myles Brand's on four substantial issues. First, the account he presents in (1984) insufficiently contrasts the case of perceiving vs attending, or focusing on abstract entities (conceiving) vs managing to conceive, and accordingly does not use the distinction between mental operation and mental act. Second, his account of *de re* attitudes is a bit confused : "De re attitudes toward abstract entities cannot be explained by causal laws alone", he writes : mental representations of abstract entities are taken to involve active attending. I disagree : there can be mental representation of abstract entities in unreflective, unattended ways. Third, the discussion of *de re* vs *de dicto* attitudes would be clearer in terms of referential vs attributive uses of the properties that one sets oneself to acquire : I can want to recall anything that happened, or have a particular recall content. This distinguishes memory from phantasm. I can also want to believe anything that is true of x : for example, that it is G or not G ; I also may want to believe that x is G, although this contradicts the normal functioning of belief as a truth-directed attitude. Fourthly, I do not think plausible to say that the objects of attitudes, in the wide sense of attitude here involved, "are sentences in the language of thought" (117).

directly attributes a property to himself, that of having, for example, perceptual property P. And *direct attribution of F* entails necessarily the identity of the *x* who makes the direct attribution and of the *y* that is being attributed *F* (43). Thus Chisholm secures the logical necessity of the association between privileged access and the use of first-person pronoun.

For a naturalist philosopher with a reductionist inclination toward selfhood, an advantage of Chisholm's analysis is that the self is not part of the *content* of direct attributions; it is therefore not part of the proposition that is entertained. But still it is the *object* of these attributions, and such a claim constitutes an enormous demand on a mind able to consider and to perceive. It seems indeed perfectly possible that an animal have a perceptual belief, and still lack the disposition of considering himself as having it, and of forming the belief that he has it.

If we now turn to the explanation of mental actions (and of attentional acts) given above, we also have a problem of maintaining the reflexive identity of the different S-tokens that occur in the definition. It is, it seems, only by virtue of what Chisholm called an "emphatic"¹⁵ sense of reflexive identity, that one can say that one changed one's own mind or directed one's own perception. This presents a problem, in particular if we want to give an account of mental acts that applies to non-human animals. In the case of non-human primates, for example, it seems to be the case both that these animals are able to orient deliberately their attention, and that they don't have a concept of themselves.

Fortunately, there is a way in which we can dispense altogether with the reflexive, in our definition of "setting oneself to acquire a mental property". In an influential paper entitled "Thought without representation", John Perry shows that a feature of thought that is nomically tied to a family of beliefs (like "here" in "it is raining", or "me" in "a ball comes to me") is not usually represented in the corresponding mental state; the fact that supplies the needed coordination between the belief and its object is external to the belief: it is the nomic fact that *I* am the one who perceives the ball and should duck for my safety, and that it is *here* that it is worth saying that it rains. "The belief need only have the burden of registering differences in my environment, and not the burden of identifying the person about whose relation to the environment perception gives information with the person whose action it guides" (Perry, 1993, p. 219).

We do have capacities for setting ourselves to perceive, to form opinions, to desire, to recall memories. But none of these requires that we master an explicit concept of the self. To act mentally, it is sufficient to be able to use internal feedback by controlling mental operations with others in a directed way. The fact that our

¹⁵ Chisholm (1981), p. 24.

capacity to direct mental operations is restricted to our own, plus the fact that our reasons to act are also our own, make the notion of mental reflexivity *functionally superfluous* at this point.¹⁶

Conclusion

Our problem was to defend the view that attentional processes, and more generally, mental acts can be hypothesised without falling prey to Ryle's infinite regress objection and to the access puzzle. The definition above dissolves the access puzzle by showing that the intentional content of a mental act is functionally related to the content or property of a corresponding mental operation. The latter triggers both the motivation to act mentally and the capacity to do so, by using an established know-how. This independence of the motivational and epistemic content of the triggering mental operation with respect to the final mental act content explains how a subject can wish and is in a position to attain a mental property which he presently fails to have.

By the same token, it responds to the infinite regress threat : if any mental act presupposes that a certain mental property is delivered by a triggering mental operation, then mental acts depend asymmetrically on mental operations. A mental act does not require a second order mental act, but it does require a specific mental operation with the associated motivations, and memorized executive links. No mental action can be performed unless there is some operation on which that action is contingent.

My argument would beg the question if the reason advanced was that postulating elementary properties prevents circularity or regress in the analysis of mental action. My argument instead consisted in showing that action in general is defined in terms that necessarily require the preexistence of mental operations. Action itself is nothing else than a sequence of mental operations, and no embedding of further actions would allow to do away with operations. On the

¹⁶ Another suggestion would be that self-consciousness in mental acts might be involved through a non-conceptual kind of content, as is claimed by Susan Hurley concerning self-consciousness in agency (Hurley, 1998, 136 sq). I agree with Susan Hurley that agency provides a non-conceptual source of self-related content (Proust, 1999). □But although agency is a crucial source for non-conceptual information about the self, (through the practical grasp of perspective : see Hurley, 1998, 142, and through the "egocentric dynamical awareness" which an agent experiences when acting : see Proust 1999), it does not provide any information about an enduring subject of experience, nor about the self as a thinking individual. These are the senses which might have to articulated if the self had to be represented for a mental action to be possible (which, I argue, is not the case). A reflexive sense of self understood in this way cannot be directly gained from any kind of non-conceptual experience. Whereas acting physically implies a sense of muscular exertion which provides a nonconceptual experience of one's own body, acting on one's mind does not imply a specific sense of how a mind looks like "from the inside". Only a social and linguistic training, in my view, allows a self to emerge explicitly as a reflexive entity.

contrary, progress in learning favours a contrary disposition: a frequently repeated stimulus-response association leads to replacing the former action-type with a corresponding operation-type (i.e. the belief-desire structure allowing the subject to select a response is replaced by an automatic stimulus-driven behavior). Now is this replacement itself gained through some mental action ? Clearly not. It is the effect of a mechanism that allows economy of resources, and that is performed so to speak in the back of the acting subject's mind.

The present considerations also have implications for consciousness, although it was not the purpose of the present paper to develop them. One is that self-consciousness is not presupposed by mental action. The kind of consciousness involved in mental action is the one related to mental content, as represented by the various operations involved : beliefs, desires, and the various appreciations of capacity that are involved in the know-how part of mental action (condition 3). Certainly, one must be able to "feel" what one is in a position to do to improve a signal or to concentrate on a task, for example feel the difference between driving sober and drunk, appreciating the level of vigilance available, etc. We either can think that these capacities are purely functional, or that they are accompanied with definite *qualia*. It seems to be a subject matter for new enquiries whether there can be a qualitative side of the coin for phenomena related to thinking - such as tip of the tongue, familiarity judgments or ease of processing judgments - that seem to inform a subject on the feasibility of directed recall for a given token.

It is worth exploring the view that self-awareness could be grounded in the practical ability to act mentally and in the correlative experience of an inner world that it provides to a developing mind. What is called "the executive theory" of theory of mind acquisition proposes that the autistic children's lack of a theory of mind could derive from a deficit in "self-monitoring". The present notion of a mental act only generalises the notion of a self-monitoring from the realm of external actions to internal ones. A proper analysis of metacognition might prove fruitful to clarify not only the internal preconditions of intentional behavior and illuminate the traditional thorny issue of volitions, but also help understand some major psychopathological disorders, such as depression, schizophrenia and autism, as directly related to mental acts and internal control perturbations.

References

- Bjorklund, D.F. & Harnishfeger, K.K., The evolution of inhibition mechanisms and their role in human cognition and behavior, in F.N. Dempster & C.J. Brainerd, (dirs.), *Interference and inhibition in cognition*, San Diego, New York, Academic Press, 1995, 142-173.
- Braff, D., Information processing and attentional abnormalities in the schizophrenic disorders, in *Cognitive Bases of Mental Disorders*, P. Magaro (dir.), Newbury Park, Sage, 1991.
- Brand, M., (1984), *Intending and Acting*, Cambridge, MIT Press.
- Broadbent D.E., (1977), The hidden preattentive processes, *American Psychologist*, 132, 109-118.
- Broadbent D.E., (1981), Selective and control processes, *Cognition*, 10, 53-58.
- Broadbent, D.E., (1982), Task combination and selective intake of information, *Acta Psychologica*, 50, 253-290.
- Calabi, C., (1994), *The Choosing Mind and the Judging Will*, Frankfurt am Main, Peter Lang.
- Chisholm, R., (1981), *The first person, an essay on reference and intentionality*, Minneapolis, University of Minnesota Press.
- Cowan, N., (1995), *Attention and Memory, an Integrated Framework*, Oxford psychology Series 26.
- Davidson, D., (1980), *Essays on actions and events*, Oxford, Oxford University Press.
- Debnar, J.A., & Jacoby, L.L., (1994) Unconscious perception : attention, awareness and control, *Journal of Experimental Psychology, learning, memory and cognition*, 20, 2, 304-317.
- Dempster, F.N., Interference and Inhibition in Cognition, An Historical Perspective, in F.N. Dempster & C.J. Brainerd (dirs.), *Interference and Inhibition in Cognition*, 1995, San Diego, New York, Academic Press, 4-26.
- Duncan, J., (1980), The locus of interference in the perception of simultaneous stimuli, *Psychological Review*, 87, 272-300.
- Fisk, A.D., & Schneider, W., (1984), Memory as a function of attention, level of processing, and automatization, *Journal of experimental Psychology : learning, memory and cognition*, 10, 181-197.
- Ginet, C., (1990), *On action*, Cambridge, Cambridge University Press.
- Gjelsvik, O., (1990), On the location of actions and tryings : criticism of an internalist view, *Erkenntnis*, 33.
- Goldman, A., (1970), *A theory of human action*, New York, Prentice Hall.
- Hornsby, J., (1980), *Actions*, London, Routledge and Kegan Paul.
- Hurley, S., (1998), *Consciousness in Action*, Harvard, Harvard University Press.
- Jacoby, L. L., (1991) A process dissociation framework : separating automatic from intentional uses of memory, *Journal of Memory and Language*, 30, 513-541.
- James, W., (1890), *The Principles of Psychology*, 2 t., New York, Dover.
- Johnston W.A. & Dark, V.J., (1986), Selective Attention, *Ann. Rev. Psychology*, 37, 43-75.
- Jones, G.V., (1987), Independence and exclusivity among psychological processes : implications for the structure of recall, *Psychological Review*, 94, 229-235.
- Joordens, S., & Merikle, P.M., (1992), False recognition and memory without awareness, *Memory and Cognition*, 20, 151-159.
- Kahneman, D., (1973), *Attention and Effort*, Englewood Cliffs, NJ : Prentice Hall.

- Kelley, C.M. & Jacoby, L.L., (1993), The construction of subjective experience : memory attributions, in M. Davies & G.W. Humphreys (eds.), *Consciousness*, Oxford, Blackwell, 74-89.
- LaBerge, D., (1975), Acquisition of automatic processing, in perceptual and associative learning, in P.M.A. Rabbitt & S. Dornic (eds.), *Attention and Performance V*, London, Academic Press, 50-64.
- LaBerge, D., (1995), *Attentional processing*, Cambridge, Harvard University Press.
- Lhermitte, F., Pillon B., Serdaru, M., (1986), Human autonomy and the frontal lobes I Imitation and utilization behavior ; a neuropsychological study of 76 patients, *Annals of Neurology*, 19, 326-334.
- Logan, G.D., (1988), Automaticity, resources and memory : theoretical controversies and practical implications, *Human Factors*, 30, 583-598.
- Lubow, R.E., (1989), *Latent Inhibition and Conditioned Attention Theory*, Cambridge, Cambridge University Press.
- Marcel, A.J., (1983), Conscious and unconscious perception : experiments on visual masking and word recognition, *Cognitive psychology*, 15, 197-237.
- Merikle, P.M., Joordens, S., & Stolz, J.A., (1995), Measuring the relative magnitude of unconscious influences, *Consciousness and Cognition*, 4, 422-439.
- Neumann, O., (1984), Automatic processing : a review of recent findings and a plea for an old theory, in W. Prinz & A.F. Sanders (eds.), *Cognition and Motor processes*, Berlin, Springer-Verlag.
- Nuechterlein K.H. & Dawson, M.E., Information Processing and attentional functioning in the developmental course of the schizophrenic disorder, *Schizophrenia Bulletin*, 10, 160-203, 1984.
- Pacherie E., (1996) "On being the product of one's failed actions", in J. Russell (ed.) *Executive Dysfunctions in Autism*, Oxford, Oxford University Press.
- Pasuraman, R. & Davies, D.R., (eds.), (1984), *Varieties of attention*, Orlando, Academic Press.
- Perry, J., (1993), *The Problem of the Essential Indexical and other essays*, Oxford, Oxford University Press.
- Posner, M.I. & Snyder, C.R.R., (1975), Facilitation and inhibition in the processing of signals, in P.M.A. Rabbitt & S. Dornic (eds.), *Attention and Performance V*, London, Academic Press, 669-82.
- Proust, J., (1997), *Comment l'esprit vient aux bêtes, essai sur la représentation*, Paris, Gallimard.
- Proust, J., (1999), Are there nonconceptual representations of action ? *Rapports et Documents du CREA*, Paris, Ecole Polytechnique, n° 9906.
- Ribot, Th., (1889), *L a psychologie de l'attention*, Paris,
- Russell, J., (1995), At two with nature : agency and the development of self-world dualism, in J.L. Bermudez, A. Marcel et N. Eilan, *The Body and the Self*, Cambridge, MIT Press.
- Russell, J., (1996), *Agency, its role in mental development*, Erlbaum (UK) Taylor & Francis.
- Searle, J.R., (1983), *Intentionality, an Essay in the Philosophy of Mind*, Cambridge, Cambridge University Press.
- Ryle, G. (1949) *The concept of Mind*, London, Hutchinson.
- Shallice, T., *From Neuropsychology to Mental Structure*, Cambridge, Cambridge University Press, 1988.

- Shiffrin, R.M. & Schneider, W, (1977), Controlled and automatic human information processing : Perceptual learning, automatic attending and a general theory, *Psychological Review*, 84, 127-190.
- Shiffrin, R.M. & Schneider, W, (1977), Controlled and automatic human information processing : Perceptual learning, automatic attending and a general theory, *Psychological Review*, 84, 127-190.
- Schneider, W., Dumais, S.T., & Shiffrin, R.M., (1984), Automatic and control processing and attention, in Pasuraman & Davies, (eds.), *Varieties of attention*, Orlando, Academic Press1-27.
- Spence, Ch. & Driver, J., (1997), On measuring selective attention to an expected sensory modality, *Perception & Psychophysics*, 59, 3, 389-403.
- Treisman, A., (1964), Verbal cues, language and meaning in selective attention, *American Journal of Psychology*, 77, 206-219.
- Treisman, A., (1988), Features and Objects : the Fourteenth Bartlett Memorial Lecture, *The Quarterly Journal of Experimental Psychology*, 40 A, 2, 201-237.
- Velleman, J.D., (1989), *Practical Reflection*, Princeton, Princeton University Press.
- Von Wright, G.H., (1963), *Norm and Action*, London, Routledge and Kegan Paul.
- Williams, B., (1973), *Problems of the Self*, Cambridge, Cambridge University Press.
- Wright, L. (1976), *Teleological Explanations, An Etiological Analysis of Goals and Functions*, Berkeley, University Of California Press.
-