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# How to play the flute

*A commentary on Dreyfus's "Intelligence without representation"*

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Well, last week we showed you how to become a gynecologist. And this week on "How to do it" we're going to show you how to play the flute, how to split an atom, [and] how to irrigate the Sahara Desert . . .

> How to play the flute. (Picking up a flute) Well here we are. You blow there and you move your fingers up and down here.

Can we describe and explain flute-playing without recourse to mental representations? Certainly; see above. Indeed, we can describe and explain flute playing without recourse to embouchures, finger coordination, breath control or any of the other things flutists seem to obsess about; see above once more. Forced to say how to play the flute in twenty-five words or less, one could do no better than this: you blow there and you move your fingers up and down here.

Professor Dreyfus offers a similarly economical account of how people learning new skills, driving a car, say, or playing chess, gain competence:

> To cope with this overload [of relevant information] and to achieve competence, people learn through instruction or experience, to devise a plan or choose a perspective that then determines which elements of the situation are to be treated as important and which ones can be ignored.

Quite so. Who would dispute it? Certainly not representationalists; not a one of us has ever claimed either that (a) there is no level of abstraction at which intelligent activity can be characterized without reference to mental representations or that (b) there is no context in which a representation-free characterization of such activity would count as explanatory. (If you were wondering, in the most basic way, how that enchanting music came to emanate from that silly-looking silver tube, the Monty Python's account might just suffice). Yet Dreyfus's examples speak only to someone who denies such truisms; they are quite irrelevant to the hypotheses that representationalists are concerned to defend.

Well, then, what *do* representationalists claim? Our position – that is, the representationalists' position – is that intelligent behavior *involves* mental representations. This claim cannot be refuted by producing descriptions of intelligent behavior that do not mention mental representations, anymore than the (perfectly accurate) description of flute playing offered by the Monty Pythons refutes the claim that flute-playing *involves* embouchure, finger coordination and breath control. The difference between representationalism and its alternatives will not emerge unless and until we begin to develop a theory of the mechanisms that implement intelligent behavior. Dreyfus purports to have a theory of these mechanisms: Learning proceeds, he tells us, by means of the growth within the agent of finer- and finer-grained dispositions to respond to "solicitations" from situations in the external world. The development of these dispositions is governed by the "agent's sense of an optimal gestalt:" the agent's body gradually modifies its responses to the environment's solicitations in accordance with environmental feedback until the agent comes to "see" how to realize her goal. The process of achieving this state is called "maximum grip" and the relationship developed between agent and world is called the "intentional arc." I do not deny that such processes and states exist; I claim, rather, that they are, in Dreyfus's account, crucially underdescribed. Once we press for details, I contend, it will emerge that the intentional arc and maximum grip themselves involve representations.

What is the relevant level of detail? Fred Dretske once remarked that, as a former engineer, he feels that he doesn't really understand a thing until he knows how to *build* it. This suggests to me a good way of operationalizing the representationalists' hypothesis, to wit: if you want to *build* a genuinely intelligent thing, you are going to have to install a system of mental representation. I can then put the representationalist challenge to Dreyfus this way: convince us that we could build a device that can forge intentional arcs and effect maximum grips without using any representations. Meanwhile, I'll tell you why representationalists think that we can't.

The general strategy for showing the necessity of representations in explaining a piece of behavior involves first showing that the behavior in question is not a function of environmental variables alone. Thus, the mere sound of thunder, the mere flash of lightning will not induce me to pick up my umbrella unless two things are true: (a) I believe that these signs indicate that it's about to rain, and (b) I desire both to go out and to stay dry while doing it. Umbrella-picking-up is no mere conditioned response to lightning-appearances; such behavior is always mediated by one or more of these inner states. And not just any inner states will do; the states need to be *intentional* states, states with content. (Otherwise, we cannot explain the patterns of behavioral similarity

and variance among house-exiters-under-thundrous-conditions and among non-umbrella-hoisters). So now we have inner states that have content, and that can play a role in the causal production of the organism's behavior. Voilá! Representations – physical states with intentional properties.

Now this is a pretty low-level example of intelligent behavior. Still, it illustrates the following important point: planned behavior consists in physical action that is, in some yet-to-be-illuminated sense, *under the control of a merely potential situation*. I pick up the umbrella partly because of what I take to *be* the case, and partly because of what I *want to be, but is not yet the case*, namely, my walking outside while remaining dry. This fact in itself is a powerful argument for the existence of representations. For how in the world can my behavior be caused by something that doesn't exist? Well, it can't. So the next question is, how can we get the *effect* of behavior being caused by something that doesn't exist? Answer: by *representing* it. That's what desires *do*: they enable us to govern our actions by situations that have not yet come to pass, as well as situations that, alas, never will or ever could come to pass. That's why Ponce de Leon could search for the Fountain of Youth, and why I can try to sound like Galway, both of us displaying intentional (if not intelligent) behavior right and left.

Dreyfus simply denies this. In his discussion of "maximal grip," he tells us that the key question, the one that separates representationalists like Searle from phenomenologists like Merleau-Ponty "is whether the intentional content (i.e., conditions of satisfaction) that governs an action must be represented in the mind." Dreyfus sides with Merleau-Ponty, who apparently answers no, "pointing out" that "an action can conform to conditions of satisfaction without the agent having those conditions in mind as a goal." The way it works is,

> . . . in absorbed, skillful coping, I don't need a mental representation of my goal. Rather, acting is experienced as a steady flow of skillful activity in response to one's sense of the situation. Part of that experience is a sense that when one's situation deviates from some optimal body-environment relationship, one's activity takes one closer to that optimum, and thereby relieves the "tension" of the deviation. One does not need to know, nor can one normally express, what that optimum is. *One's body is simply solicited by the situation to get into equilibrium with it*. [my emphasis]

What I take Dreyfus to be saying here is that the causal function that I have assigned to a representation of one's goal can somehow be fulfilled by the extant environment, that the environment itself can call forth an appropriate response from an organism. My point is that if one's goal is to bring about some situation that does not yet exist (and if this is not true then one suffers from a serious lack of ambition) there's nothing out there to do the soliciting.

The example that Dreyfus borrows from Merleau-Ponty in order to "help convince us that no representation of the final gestalt is needed in order for the skilled performer to achieve it" is telling. It is a soap bubble:

> The bubble starts as a deformed film. The bits of soap respond to local forces according to laws which happen to work so as to dispose the entire system to end up as a sphere, but the spherical result does not play a causal role in producing the bubble.

Quite so. The only problem with this as an analogy to intelligent behavior is that it *isn't*. What are the analogues to the "local forces" that are responsible for the development of a soap bubble? Of course the spherical shape doesn't need to be represented by the bubble; the soap isn't *trying* to become a bubble. The bubble isn't *doing* anything; becoming a bubble is just what happens to soap under certain conditions. Would that it were so with flute-playing. Here I sit, not sounding like Galway. I'm waiting. . . . Nope, no local forces have taken over.... It looks like physics is content for me to do any number of different things, including continuing to just sit here. What we need to get things going is for me to form some intention, in this case, to pick up my flute and play something, with the (let's be charitable) vague hope of sounding like Galway. Unlike films of soap in the presence of media of differing pressures, then, human bodies tend to sit limply unless we direct them to do something specific. Or to put it another way, bodies don't do anything at any rate, they don't *behave* unless we want them to. There just is no particular behavioral response that my environment "solicits," elicits, or otherwise draws from me. That is both the glory and the tragedy of intentional agency.

I find it noteworthy that Professor Dreyfus himself seems unable to describe the process of gaining maximal grip without referring to a variable that's independent of the state of the environment. I'm speaking of his appeals to the "optimal gestalt." Discussing the expert tennis player, who smoothly and unselfconsciously modifies the position of his racket to meet the oncoming ball: "One feels that one's comportment was caused by the perceived conditions in such a way as to reduce a sense of deviation from some satisfactory gestalt." This makes it sound like the tennis player has an *idea*, a representation of how he wants the ball to move. But Dreyfus moves immediately to forestall that interpretation: "But that final gestalt need not be represented in one's mind. Indeed, it is not something one *could* represent. One only senses when one is getting closer or further away from the optimum."

Now this pretty much begs the question, in my book. But it so begs the question, that it makes me think that Professor Dreyfus is not really interested in the same question I am. I suspect that he is conflating at least three sepa-

rate questions one might ask about the role of representations in the production of intentional behavior:

1. Must representations always be involved in goal-directed behavior?
2. Must representations always be consciously accessible in the performance of goal-directed behavior?
3. If and when representations are involved in the production of goal-directed behavior, *what is it that is represented*?

Orthodox representationalists like me insist on keeping these questions apart. We think we make a strong case for *presuming* that intentional behavior involves representation. We then must confront the kind of phenomenological evidence that Professor Dreyfus quite accurately showcases: the vast number of cases in which we do things quite intentionally, but without any conscious rehearsal of either the goal we seek or the means by which we hope to achieve it. The solution, of course, is to posit *unconscious* representations. While this may look like a move of desperation to some, I refer the skeptical to the arguments above; without appealing to representations of some form, explain the difference between agents and soap bubbles.

I find Professor Dreyfus's phenomenological characterizations of the progression from novice to expert thoroughly compelling. It's true that when I play my flute now I do not need to think about many of the things that I had to pay explicit attention to when I first started. It's like that with driving a car, making an omelet, knitting a cable stitch, and many other activities. There's a significant body of literature on the development of expertise, much of it focusing on the "automatization" of motor routines. But the fact that we can "automate" sequences of intentional behavior, so that we do not need to give ourselves conscious instructions at every step of the game, hardly shows that representations were not a crucial part of the process. Indeed, Professor Dreyfus does not even claim, much less try to show, that the early stages of learning can proceed without representations. His examples rely crucially on there being a stage in which the routines are *consciously* represented. My current point is that the fact that the consciousness goes away doesn't mean that the representations have, too. Elegant computer code makes heavy use of subroutines and calls; there's no reason that Dreyfus has given us not to think of the automatization of motor routines as the creation of a sub-routine, which, once coded, can be simply called by the master program, and left to run itself.

Furthermore, it's possible that I might manage some small progress toward my overall musical goal without explicit consideration of embouchure or head

joint angle or breathing technique. My mind and body, working together for a change, may have routinized a method of responding to the feedback my ears provide, so as to produce just the small alterations in each of these factors that will improve the sound. They may even have managed this by commandeering a neural netlet, getting its connection strengths adjusted so that it will relax more and more, the closer I get to producing those golden tones. (And this, by the way, brings up another cluster of easy-to-conflate issues: do connectionist systems involve representations? If they do, are the representations causally efficacious? Can a symbolic process be implemented in a connectionist system?) I am, after all, making a host of adjustments unconsciously in the course of routine play tuning up that note, changing the tone color, matching my partner's articulation. But one thing is still necessary. My overall goal has got to be causally implicated in one way or another. Whether I tell myself explicitly, "roll out, you're flat" (as I sometimes do) or simply make the adjustment without even realizing it in some way or other. It's got to be there, in some sense, in order for the right set of "local forces" to kick in.

There's another thing that Professor Dreyfus might be pointing to, and that is that activities that we might naively think involve explicit representations of goals can turn out to involve processes of quite a different kind. I've been told (by someone my memory swears was a reliable source), that research on expert outfielders revealed a surprising answer to the question of how these players manage to position themselves on the field so as to make the catches. It turns out that they do not make some calculation of where the ball is likely to land and then head for that spot. Instead, it seems, their strategy is to keep moving in such a way as to keep constant a certain angle in their visual field formed by the ball and some other parameter. Certainly this process involves no representation of the outfielder's proximal goal in this case, the spot on the field where he or she wants eventually to end up. But the fact that that proximal goal is not represented is no argument against the fundamental point that the outfielder better have had *something* in mind, some more ultimate goal, like catching the fly, or the player wouldn't have initiated this little subroutine in the first place.

A related, but different point is made by the efficacy of *heuristics*. We sometimes discover that we can obtain X more efficiently by trying to get Y, or rather, by thinking of the task as one of trying to get Y. This may be especially true in cases of motor learning, where focusing directly on the particular motor movements we want tends to be counter-productive. So in learning to ski, if you have a good teacher, you'll be told to do the snowplow turn by trying to reach for something beside you on the ground, rather than (as you'll be told if

you have a bad teacher) to shift your weight off the uphill ski and onto the downhill ski. (Trust me you're splayed out on the ground before you finish figuring out which is your uphill ski.) But you still have to be trying to master the snowplow turn, or you'll still be sitting by the fireplace with a hot toddy. The paradox of hedonism tells us that we can't achieve happiness by aiming directly at it. Nonetheless, we need to aim at *something*.

I've tried to produce an in-principle argument that intentional action involves representation, at least to the extent that a contentful desire is required to get the thing moving. Truth be told, I rather suspect that there's an internal connection between the notions of "intelligence" and "representation." This is because I think it is probably true that intelligence essentially involves calculation, and calculation presupposes representation. But fortunately, my mandate does not require (nor permit) me to defend that larger claim, so I'll leave the matter here.