

A Neurobioethical Perspective on Informed Consent

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Autonomy comes in degrees and neuroscience can't have the last word

The grounding questions are: who is competent? And who is sufficiently competent to be endowed with legal autonomy? My answer: competency can collapse into autonomy if the latter is appropriately defined and it comes in degrees. My definition of autonomy: autonomy amounts to a specific set of neuropsychological capabilities, which can be amenable to objective assessment and quantification.

My idea of coming in degrees: autonomy is not an all-or-nothing concept, but in each individual it can span from a minimum to a maximum and it is a matter of conventions to set the minimum level of autonomy to give one's consent in each situation. Neuroscience can't say when an individual is autonomous because its data underdetermine the understanding and behavioral capacities an individual can display. There is not a direct correspondence between brain functioning and neuropsychological abilities. It is a scientifically informed decision on the degree of autonomy requested which sets the patient's or participant's capacity of consent.

Premise: the idea of capacity

A conceptualization of autonomy that tries to avoid both the stall of the metaphysical debate and the difficulties of neuroscience and empirical psychology, still partial and controversial, is linked to the idea of "capacity". By capacity, in this context, one means

the availability of a repertoire of general skills that can be manifested and used without the moment by moment conscious control. Responsible persons are those with the adequate level of mental capabilities, namely those that are necessary in order to be moral agents. A person can be held accountable for her behaviour if her actions are the outcome of mechanisms that confer upon this person mental capacity such as the ability to perceive the world without illusions, to think clearly, to drive her own choices in light of her judgement, and to resist the impulse of acting instinctively. The central idea is therefore that of mental abilities.

The compatibilist view of responsibility (meaning the ability to answer for one's actions and to assume the consequences at the cognitive level and subsequently at the moral one) is well illustrated by Fischer and Ravizza¹. Based on their theory, we can say that this kind of responsibility (which is the premise to moral responsibility), whether or not determinism holds true, is based on control – not regulative control, which assumes the possibility of doing otherwise, but guidance control, which "should be understood in terms of two elements: the agent's 'ownership' of the mechanism that actually issues in the relevant behaviour, and the 'reasons-responsiveness' of that mechanism. So, for example, an agent is responsible for an action, on our account, to the extent that this action issues from the agent's own, reasons-responsiveness mechanism"².

Fischer and Ravizza's argument holds that in order to be responsible, some form of control is necessary – the type of control which,

for example, a driver has who wants to turn right and succeeds in doing so by bringing the necessary skills to bear, even though a mechanical malfunction prevents the vehicle from turning left. Assuming one has guidance control, the second condition holds that one must be able to understand the reasons behind certain behaviour and be able to apply them to one's own actions.

If, according to Fischer and Ravizza, cerebral lesions or mental illnesses can impair the guidance control, this does not happen when the agent is reasons-responsive. When an agent is (for example) hypnotized, he is not sensitive to reasons in the appropriate way. But if instead – assuming one is not under the influence of seriously pathological influences, manipulations, or situations – an agent ponders whether to turn part of her salary over to a charity organization, weighs the pros and cons, and reaches the decision to devote that sum, the agent can be considered responsible and be praised for an altruistic choice to help the poor. The difference thus lies in the ability – which can manifest itself in various degrees – to respond to reasons with a measure of guidance control. A key ingredient in our account is regular reasons-receptivity. This sort of receptivity involves a coherent pattern of reasons-recognition. More specifically, it involves a pattern of actual and hypothetical recognition of reasons that is understandable by some appropriate external observer. And the pattern must be at least minimally grounded in reality³. This approach based on capacity and cognitive control encompasses a synthetic idea of freedom and responsibility useful precisely for moral and legal contexts.

Operationalizing autonomy

The ultimate goal of the project is to overcome the interpretative and factual controversies with an operationalization and measurement of the capacities that identify the freedom-responsibility, or autonomy, of the subject. The so-called interpretative controversies would be overcome by finding a spe-

cific and operationalized definition, on the basis of reliable data that can be gradually made more precise with the refinement of the tools and the integration of theoretical knowledge. In other words, the aim is to make someone's degree of autonomy measurable, by resorting to the abovementioned notion of capacity. The so-called factual disputes concern instead the actual possession by the given individual of the abovementioned capacities and control that make her free and responsible. In other words, the aim is to establish in an increasingly precise way the extent to which a person is autonomous in terms of capacity and control.

The cognitive abilities we mentioned could be operationalized as a set of neuropsychological tests. They would be used to measure specific executive functions, central to the idea of control. Executive functions, or control functions, allow one to organize and plan one's behavior⁴. These skills are required to perform intentional activities, aimed at achieving objectives, monitoring and performing multiple tasks simultaneously, changing behavior based on feedback on the results obtained. They are involved in tasks of abstraction, inventiveness, judgment and criticism. A potential deficit would be evident in daily living, manifesting itself as inappropriate social behavior, problems in decision making and in the ability of critical judgment, difficulty in conceiving, performing and changing action plans adapting them to changes in the environment, excessive distractibility, and so forth⁵.

In general terms, the executive functions refer to the set of mental processes necessary for the development of cognitive-behavioral patterns adaptive in response to new and demanding environmental conditions⁶. The domain of executive functions includes:

- the ability of planning and evaluation of effective strategies in relation to a specific purpose related to the skills of problem solving and cognitive flexibility;
- inhibitory control and decision-making processes that support the selection of functional response and the modification

- of the response (behavior) in relation to changing environmental contingencies;
- attentional control referred to the ability to inhibit interfering stimuli and to activate the relevant information;
 - working memory referring to the cognitive mechanisms that can maintain online and manipulate information necessary to perform complex cognitive tasks.

Measuring autonomy

In this light, a hypothesis is that of relevant tests – compatible with one another – and, pondering adequately the weight of each, a uniform index: a sort of IQ-like profile that would attest the subject’s relevant cognitive skills. This is consistent with the few proposals so far advanced in order to operationalize free will/autonomy.

Two executive functions turn out to be central: (i) the ability to predict the future outcomes of a given action; and (ii) the ability to suppress inappropriate, i.e., not sufficiently valuable, actions. Importantly, these two executive functions operate not only during the genesis of an action, but also during the planning of an already selected action. In fact, during the temporal gap between the time when an action has been chosen and the moment when the motor output is going to be generated, the context might have changed, altering the computed value of the action and thus requiring a radical change of the planned motor strategy⁷.

Below I present my choice between common tests widely believed to be reliable in their area of evaluation. For each there is a brief explanation of the features, the route of administration and cognitive function being tested.

| TESTS | COGNITIVE FUNCTIONS | |
|--|---|----|
| Raven Progressive Coloured Matrices | Clear-thinking ability and logical deductive reasoning | ES |
| Trail Making Test | Multitasking attention, conceptual set-shifting abilities, mental flexibility | ES |
| Stroop Test | Automatic response inhibition | ES |
| Wisconsin Card Sorting Test | Ability of “set-shifting” | ES |
| Weigl’s Color-Form Sorting Test | Ability of problem-solving | ES |
| Digit Span Backward | Working memory | ES |
| Verbal Judgment Task | Acquired-knowledge verbal logical reasoning | ES |
| Simplified London Tower Test | Planning, working memory and nonverbal problem-solving | ES |

| Supplementary Tests | COGNITIVE FUNCTIONS | |
|---------------------------|---|--|
| Iowa Gambling Test | Decision making under ambiguity | |
| Cognitive Estimation Test | Deductive reasoning | |
| Go-No Go Test | Sustained attention and response control/inhibition | |

Decisional Quotient (DQ), autonomy as capacities and self-control

All the tests should be corrected for age and education and then transformed into new standardized scores (Equivalent Scores, ES) on an ordinal scale, e. g. (according, for example, to Italian norms) ranging from 0 to 4, with 0 representing scores below cut-off point and 1 including borderline tolerance limit⁸. Specific standardized scores exist in many countries or linguistic areas. The subjects would get for each test a raw score (or RS), given by the sum of the scores obtained in each item that makes up the test, which would then be standardized. In short:

- 0 = scores below cut-off point
- 1 = borderline tolerance limit
- 2 = sufficient
- 3 = more than sufficient
- 4 = equal to or better than average.

The tests would be used in a partially new way, so there should be a slightly different interpretation of the quantitative data. Since the idea of granting freedom to people is an intuitively clear enough, the first description of the numerical values may be as follows. It is understood that this is a sketched proposal, which is expected to be significantly refined with practice.

Prevalence of ES = 0: the subject manifests an inability in dealing with decision-making tasks.

Prevalence of ES = 1: the subject exhibits a very low capacity in dealing with decision-making tasks.

Prevalence of ES = 2: the subject shows a capacity in dealing with decision-making tasks that presents strong limitations in many areas compared to what is believed to be the standard.

Prevalence of ES = 3: the subject shows a capacity in dealing with decision-making tasks that has some limitations in specific areas compared to what is believed to be the standard.

Prevalence of ES = 4: the subject shows a capacity equal to or better than the average in dealing with decision-making tasks.

If there is not the prevalence of a particular ES or the subject manifests a varied profile, in the presence of scores from 0 to 1 the subject will have to be regarded as having a severely limited capacity at least in some areas, which tends to affect the entire capability profile. Moreover, the ES-free tests suggested as possible complementary tests would help to refine the discrimination between equivalent values in interpersonal comparisons and could then be integrated in the general index.

DQ as a first step

As we tried to explain, a synthetic index such as the one we propose measures a certain range of cognitive and behavioural control skills that configure a certain kind of autonomy at the psychological-functional level. These are potential capacities measured with standardized instruments and laboratory situations, which do not consider any other factors that may restrict the freedom of a subject in specific situations, such as those that are relevant in moral scenarios and legal contexts. However, an index such as the one here proposed could be the first step, certainly imperfect, towards more objective measures to discriminate between degrees of autonomy.

The index proposed, springing from the composition of neuropsychological tests to assess neurocognitive deficits, is characterized by better assessing the space that could be called “from normality to pathology, and the various degrees of pathology.” To enrich the index, in the future one may think about other two elements to be integrated with appropriate tests. One concerns mental openness, operationalized and measured by tests of creativity (which we know are still not very accurate nor reliable) and the other concerns the repertoire of personal experiences (difficult to operationalize) that influences the degree of autonomy as functional capability of the monitoring system, powered by known alternatives in memory.

NOTES

- ¹ J.M. FISCHER, M. RAVIZZA, *Responsibility and Control: A Theory of Moral Responsibility*, Cambridge University Press, Cambridge 1999.
- ² *Ibid.*, p. 241.
- ³ *Ibid.*, p. 90.
- ⁴ A. BADDELEY, B. WILSON, “Frontal Amnesia and the Dysexecutive Syndrome”, in: *Brain and Cognition*, vol. 7, n. 2, 1988, pp. 212-230.
- ⁵ P.W. BURGESS, T. SHALLICE, “The Relationship between Prospective and Retrospective Memory: Neuropsychological Evidence”, in: M.A. CONWAY (ed.), *Cognitive Models of Memory*, Psychology Press, Hove (UK) 1997, pp. 74-90; G.A. GIOIA, P.K. ISQUITH, S.C. GUY, L. KENWORTHY, “Test Review Behavior Rating Inventory of Executive Function”, in: *Child Neuropsychology*, vol. 6, n. 3, 2000, pp. 235-238.
- ⁶ P. RABBITT (ed.), *Methodology of Frontal and Executive Functions*, Psychology Press, Hove (UK) 1997.
- ⁷ G. MIRABELLA, “Should I Stay or Should I Go? Conceptual Underpinnings of Goal-Directed Actions”, in: *Frontiers in Systems Neuroscience*, vol. 8, 2014, article 206, p. 1.
- ⁸ E. CAPITANI, “Normative Data and Neuropsychological Assessment: Common Problems in Clinical Practice and Research”, in: *Neuropsychological Rehabilitation: An International Journal*, vol. 7, n. 4, 1997, pp. 295-310.