FREEDOM AND NEUROBIOLOGY: A SCOTISTIC ACCOUNT

by Guus Labooy

Abstract. With the aid of some Scotistic conceptual distinctions, I develop a way of meeting the apparent deterministic sway of neurobiology. I make a careful distinction between formal and material freedom. Formal freedom, the ability to will or not to will a certain state of affairs regardless of whether it can be effectuated, remains, even if our material freedom to effectuate it is hampered by neurobiological mechanisms. These conceptual findings are linked with contemporary empirical research on obsessive-compulsive disorder and the possibility of volitional modulation of cerebral function.

Keywords: freedom; neurobiological determinedness; philosophy of psychiatry; Scotism.

Empirical findings of contemporary neuroscience suggest that human behavior is caused entirely by neurobiological mechanisms. Our commonsense view of freedom and responsibility then seems illusive. For Christians this raises even more worries for the obvious reason that these empirical data seem to endorse all kinds of already existent deterministic and physicalistic persuasions, views hardly compatible with the Christian faith. Obviously this constitutes a major philosophical issue: How can we account for human beings as both neurobiologically determined and free?

For a long time, the dominant way of addressing this problem was some sort of nonreductive physicalism (NRP) linked with compatibilism. In NRP, unrelenting physicalism is softened by pressing the point that the mind, however determined by our physical state, still cannot be reduced to matter, just as a painting like Rembrandt's *Nachtwacht*, though it consists of physical matter, cannot be reduced to that substance. Compatibilism,

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the close associate of NRP, declares freedom *compatible* with NRP's inherent determinism by pointing out that the real meaning of being free is having success—clearly an evolutionary concept of freedom—or having the experience of the absence of constraint. So, according to most kinds of compatibilism, free acts, however determined they are, are spontaneous and socially successful acts, devoid of any experience of constraint. However, NRP leaves many questions unanswered, and it has been argued that fifty years of physicalism brought the philosophy of mind to a blind alley (Haldane 2000, 301–11). According to many, determinism, NRP, and the associated compatibilism fail to provide an adequate, commonsense understanding of freedom. We need to step beyond these conceptual and ontological boundaries and survey a new, broader horizon. Leaving further philosophical analysis of the various sorts of physicalism aside (see Labooy 2002), in this contribution I attempt to show that the philosophy of Duns Scotus offers some decisive conceptual clues for the analysis of the data of neuroscience and free will.[1]

This proposed linkage between neurobiology and Scotism may sound rather far-fetched. However, we should not forget that the Franciscan John Duns Scotus (1266–1308) was "one of the most able and acute thinkers Britain has produced" (Copleston 1972, 213). After entering the Franciscan order, Duns Scotus lectured at Oxford, Paris, and Cologne and soon became known as the "*doctor subtilis*." "Of a critical turn of mind and gifted with an ability to discover fine distinctions and shades of meaning, he possessed at the same time a power of constructive systematization" (Copleston 1972, 213). In what follows I take advantage of this "ability to discover fine distinctions and shades of meaning," for his able mind focused on the issues of freedom, contingency, and necessity. In fact, he provided us with some decisive conceptual and ontological tools necessary in order to face the modern challenges of neurobiology and neurophilosophy.

The Scotistic analysis of freedom is firmly rooted in the Augustinian account of the human being as a free individual whose real freedom, under the present dispensation, is still concealed. One day it will be fully revealed and fulfilled in a freely acknowledged though divinely worked regeneration: freedom has to be recreated and restored by grace. At the same time, our dispositions, habits, and desires will not be put aside in this view; on the contrary, by being redirected they will be purified. Just as Augustine states in his confessions: "Our hearts were made for Thee, O Lord, and they will not rest 'til they rest in Thee" (I, 1). Thus, the Augustinian account of the human being is essentially a balanced view acknowledging desire and freedom, dispositional longings and free will, or, more scientifically speaking, neurobiological dispositions and freedom. Duns Scotus was the first important philosopher to provide for an in-depth analysis of this wonderful human constitution.

I begin by exposing the apparent deterministic dilemma more broadly. As a former physician, I have always been interested in the field of psychiatry. I therefore state the actual dilemma in psychiatric terms. After a short account of the concept of disposition, I then explain the important distinction between formal and material freedom, a Scotistic heritage. Next I address issues of neurobiology, applying the newfound conceptual tools to an actual psychiatric disease and to the philosophy of neuroscience.

The Dilemma

The issue of neurodeterminism runs like a fundamental anthropological dilemma through the entire field of psychiatry. Stephen Mitchell, speaking of psychoanalysis, has formulated the problem as follows:

> From its inception psychoanalysis has been plagued by the problem of the will. In one sense, the content of the mind (both normal and pathological) seems to be a causal product, shaped by past events, constitutional givens, and current influences. In another sense, the content of the mind seems to be chosen, reflecting firm convictions and deep commitments (both conscious and unconscious). How can these two ways of thinking about the mind be reconciled? Is human thought part of a causal chain or is it self-initiating and freely generated? (Mitchell 1988, 239)

What is true of psychoanalysis also applies to biological psychiatry, and from the biological point of view these questions seem to become even more urgent. Nancy Andreasen comments, "The biological perspective seems to replace one type of determinism (the psychoanalytical—GL) with another, which may seem even more awesome and overwhelming" (1984, 253). These two dimensions of reality—the two semantic fields that appear to clash in the quotation from Mitchell—should be analyzed. What precisely is a "causal chain"? What is it to be "self-initiating and freely generated"? I approach the first semantic field with the concept of *disposition* and the second with the concept of *freedom*. Can these concepts be consistently elaborated and combined with each other?

Contingent Dispositions

The concept of disposition plays a central role in twentieth-century philosophy of mind and functions prominently in the modern sciences. It conceptualizes fixed patterns in reality. That is to say, dispositions describe "how things . . . would behave in certain circumstances" (Crane 1996, 2). With the concept of disposition we are able to account for all kinds of causal chains, including all neurobiological mechanisms. Needless to say, if we adopt a deterministic concept of disposition, the prospect for authentic freedom looks dark. So although this contribution is not focused on the analysis of disposition, we must address the concept briefly.

We all acknowledge that human beings have many biologically anchored dispositions and desires. These intertwined mental and biological desires, being important forces in human life, could still be combined with human freedom: we could picture these dispositions as motives, and the essential thing about motives is that we are supposed to select and value them. They are forces that constitute our innermost nature or identity, powers we either use and embrace or reject and counteract. Those who believe that these propelling forces are deeply deterministic in nature are doomed to accept compatibilism. We therefore need a nondeterministic, or contingent, concept of disposition.

I assume such a contingent concept of disposition here and will briefly describe its more precise nature.[2] I think that all kinds of biological and physical causality, even physical dispositions like the combustibility of fuel, are nondeterministic, or contingent, in character. The kernel of this thought is the insight that causal relations are created. They are, therefore, contingent; they could have been different (synchronically[3]). To argue in a rather Humean way, with logical tools already present in most medieval texts: We acknowledge a real distinction between causal relations in physical reality and necessary relations. A suitable example of the latter is the relation between "bachelor" and "not being married." Obviously, dispositional relations are not marked by the strict necessity of such logically necessary relations. Neither do they fit in with still another form of necessity, *ontological* necessity. An ontologically necessary state of affairs is a state of affairs that could not have been otherwise (technically speaking, occurs in all possible worlds; see Bradley and Swartz 1979). Causal relations, however, are relations in their own right: the effect is never ontologically necessary, not even in physical relations, because contingent causal mechanisms can never result in ontologically necessary states of affairs. Something that is itself contingent cannot produce a state of affairs that cannot be different (is necessary). This applies to all kinds of natural dispositions, regardless of whether they are physical or biological in nature. Clearly the difference between physical and neurobiological dispositions lies in the fact that the latter are much more malleable (see Labooy 2002, chap. 5). Thus we might obtain a first intuitive grasp of contingent dispositions.

The term *nomic* or *physical* necessity, as contrasted with *logical* or *ontological* necessity, often is used to refer to the sort of lawlike causation discussed here. Although I think that this terminology is somewhat misleading because it dubs a contingent causal relation "necessary" (albeit physically necessary), this distinction aligns with what I have in mind when I speak about contingent physical and biological dispositions.

A possible misunderstanding needs to be mentioned. I do *not* have in mind a God-of-the-gaps kind of freedom. It is not the case that the brain's causal circuitry has some weak spots in its inner mechanism where free-

dom should seek to make its fortune. The point is rather that the concept of "necessary causal relations" bewitches our mind, leaving behind heavy sediments of rigid causal metaphors. However, "necessary causal relations" just do not exist, for they are causal, not necessary. Our neurobiological circuitry is apt by nature to propel us in some direction or other, but at the same time it is compliant to a certain degree. Thanks to the malleable nature of our neurobiological state, we might even suppose that it could be reworked by free will, if free will happens to exist. For even without the deterministic flaw contained in several theories of natural causality, our commonsense experience does seem to question the existence of real freedom. We need only think of all kinds of coercion by inner or outer forces.

Let us therefore concentrate on the link with freedom, for developing a contingent causal relation in biology or neurobiology is not tantamount to a solution to the problem of freedom. Nondeterministically caused is not the same as freely caused. Even if we allow for a contingent framework of dispositional causality, the task remains of combining it with freedom. Scotus' philosophical heritage gives us some important conceptual clues here. I will apply Scotistic conceptual distinctions to the philosophy of neuroscience.

The Distinction between Formal and Material Freedom: A Franciscan Heritage

In the Franciscan tradition, freedom is regarded as an essential property of the human will; the will as such is therefore free. The conceptual harvest of that tradition has been neatly digested in Eef Dekker and Henri Veldhuis's article "Freedom and Sin: Some Systematic Observations" (Dekker and Veldhuis 1994, 153–61). I will use this analysis of freedom in the debate on neurodeterminism. Their contribution turns on the conceptual distinction between *formal* and *material* freedom. Formal freedom is the freedom of willing or not willing, apart from whether it is possible to realize the object of choice. Only with respect to material freedom does the question arise of whether we are also able to effectuate the volition, that is, whether we also have the freedom to realize the object of choice. The cardinal point is the distinction between the will and the potential for effectuating the will. This is a legacy of the Franciscan tradition of "faith seeking understanding."

By way of illustration, consider those who are locked up in prison. Such persons have the freedom to will their release or not. If they will their release, however, they are unable to effectuate it. They have formal freedom but no material freedom. Formal freedom turns on the insight that a volitional act as such also has a possible alternative. Thus, I define it as follows:

Formal freedom is the ability, essential to humans, synchronically to will or not to will or to will the opposite of a certain state of affairs p, *regardless of whether* p *(or* –p*) can be effectuated.*

I mentioned earlier that freedom is regarded as an essential property of the human will. This definition attributes the essential aspect more precisely to *formal* freedom. Only formal freedom is essential to all humans, and we cannot lose it. Not even the Fall deprived us of it.[4] However, in this definition we have a new concept, briefly encountered when speaking about contingency in the last section: the term *synchronic*. This concept is connected with the pivotal Scotistic concept of *synchronic contingency.* Let me elaborate on this, because it plays a decisive role in the definition of formal freedom.

For Scotus, a state of affairs *S* is possible if it could also, synchronically, not have obtained. Formally, it can be expressed thus:

$$S \text{ at } t_1 \text{ and possible } -S \text{ at } t_1.$$

This implies a revolution in modal logic in relation to Aristotle; what is at stake is the very meaning of the term *possible*. In the Aristotelian model, the concept *possible* refers to *alternative options at different moments:* Ontologically and conceptually there can be no place for *synchronic*, unrealized possibilities. This in fact is the famous Aristotelian "principle of plenitude": No genuine possibility can remain forever unrealized (Knuuttila 1982; Hintikka 1973). According to this modal principle, the notion of an unrealized, synchronic alternative to the actual being-the-case of *S* is inconsistent. If something really is a genuine possibility, it has to be realized somewhere on the axis of time. If it is never realized, it was not a genuine possibility, only an illusion. So, according to the Aristotelian modal theory, talk of unrealized, synchronic alternatives to the actual being-the-case of *S* is a chimera.

However, if for any and every state of affairs *S* there is no synchronic alternative, every state of affairs *S* is (synchronically) necessary:

> But if, at the same point in time at which p is the case, –p is impossible, the implication is that, for that moment, p is necessary. . . . Thus, in the Aristotelian model, contingency means no more than change over time, a change which consists of the succession of states of affairs that are in themselves necessary—so that the change itself is therefore also necessary. (Dekker and Veldhuis 1994, 154–55)

This important quotation makes it clear that mutability should not be identified with contingency. Often, however, the two are confounded, which leads to confusion.

In short, Duns Scotus is credited with unveiling the true nature of contingency, that is, *synchronic* contingency. The common notion that contingency consists of the possibility of *change over time* is shown to be illusive. The possibility of change over time does not ensure real contingency.

With regard to my definition of formal freedom, the fact that someone could have willed otherwise is conceptualized in synchronic terms: it concerns a synchronic possibility, a synchronic alternative to the actual willing *p*. The diachronic view of contingency, which often remains implicit, is thereby rejected. The importance of this apparent detail of synchronic contingency in the definition of formal freedom can now be shown. The concept of formal freedom implied the ability to will *p* or *–p*, regardless of whether *p* (or *–p*) can be effectuated. But it makes no sense to define formal freedom as the ability to will or not to will a certain state of affairs *p* if this very ability does not exist because willing *p* at t_1 is necessary. If there is only an exclusively diachronic alternative for willing *p*, then willing *p* is necessary at t_1. It is true that in this case an alternative possibility of willing *–p* at t_2 obtains; even so, this secures only mutability, not contingency. For, obviously, willing *–p* at t_2 is likewise necessary. The additional question of whether we are also able to *effectuate p* has become irrelevant, for the willing of *p* is now itself necessary. Formal freedom cannot exist if all states of affairs are synchronically necessary. So much for the theory of synchronic contingency of the *doctor subtilis*: it is in fact the ontological and modal precondition for a consistent noncompatibilist concept of formal freedom.

Apart from the concept of formal freedom there is also the concept of *material* freedom: One cannot always effectuate everything that one wills. I define:

Material freedom is the property, accidental to humans, that they can effectuate a certain state of affairs p.[5]

A major difference from formal freedom is the fact that material freedom is accidental. Sometimes we can leave prison if we want to, but at other times we cannot. Humans have formal freedom essentially, but material freedom is limited. Formal freedom is a yes or no concept. Animals do not have it; humans do. Material freedom is gradual: unlike formal freedom, there are degrees of material freedom. Some, for example addicts or prisoners, experience a serious limitation of material freedom. Others experience a wide range of material freedom: they can effectuate whatever they want. True material freedom, however, according to Scotus' tradition of faith seeking understanding, is a gift of grace and an eschatological category. Then, at last, we have learned to will the only right thing!

With this conceptual distinction at hand, we can clearly see that *limitations to our actions are not yet limitations of the will*. The prisoner cannot leave, yet he has formal freedom: does he want to leave prison or not? The drug addict cannot stop her addiction, but she can decide whether or not she *wants* to stop. This was recognized by Harry Frankfurt in his famous paper ([1971] 1982, 5–20) where he made a distinction between the addict who was fighting addiction and the wanton who was not.[6] Formal

freedom is not affected when material freedom is limited. The occurrence of constraint does not affect the very core of our will, the formal freedom to will or not to will *p*, regardless of the ability to effectuate *p* (or *not-p*). Yet, because formal and material freedom are often confounded, this important distinction remains unnoticed, and consequently the occurrence of constraint is used to argue for the absence of free will.

In conclusion, at least three "important systematic ideas" (Dekker and Veldhuis 1994, 155) should be included in the conceptual analysis of freedom: (1) the theory of synchronic contingency, (2) the power of will, which can produce a volition in a synchronically contingent way, and (3) the distinction between a volition and the factual effectuation of the object willed. Given (3), it may be asked why we speak of formal and material freedom and not simply of the capacity for willing and the capacity to effectuate our will. Would that not bring us more directly to the heart of the distinction? Despite the simplicity of this suggestion, there is good reason to employ the technical terminology of formal and material freedom. It has to do with the fact that *will* is a broader concept than formal freedom. Formal freedom is (analytically) a property of the will, but *will* has another meaning as well. It has the meaning of a tendency or desire. In "the will to believe" we can distinguish the dispositional aspect of desire together with the aspect of decision. In "the will of the people" the aspect of desire is even more prominent. So at least these two meanings are covered by the concept of will—it encompasses both formal freedom and the dynamic aspect of desire. This is the motivation behind the use of the more precise concept of formal freedom.

We should be on guard, however, lest this more technical terminology lead us astray. We should not get the impression that formal and material freedom are two different types of "act centers" in the soul. Such confusion can be avoided if we keep in mind that the formal/material distinction turns on the simple fact that to say that *p* can be willed is not the same as saying that *p* can be effectuated. This careful distinction between formal and material freedom is pivotal in the debate on neurodeterminism.

Excursion: Contemporary Neuroscience

This Franciscan analysis of freedom enables us to state clearly again that limitations to our actions are not yet limitations of the will. The prisoner example illustrates this point. Now, the central idea is that we can apply this conceptual distinction to the immanent level, the level of neurobiological processes, which have a conscious, psychological side as well.

To those unfamiliar with neuroscience, this may sound strange. Why not distinguish more sharply between the mental and the neurobiological realms? Weren't we trying to follow Duns in "discovering fine distinctions and shades of meaning"? Here we must enter briefly into the modern

findings of neuroscience. It has increasingly been shown that the mental realm has firm neurobiological underpinnings. This, in fact, helped prompting the sake of all sorts of monism and physicalism, like NRP discussed earlier. In order to explain this kind of empirical research, let me describe in brief a research project of a leading American psychiatrist, Eric Kandel.

Kandel and his coworkers conducted tests on the Aplysia species, a kind of sea snail. They gave repeated electric shocks to these animals and then observed their behavior. It turned out that flight behavior could be linked to changes in the molecular biology of the snails. The study yielded the conclusion that "the molecular biological structure of sensitization [a specific form of chronic anxiety behavior] in the Aplysia sea-snail has been unravelled" (Glas 1991, 176). Starting from such findings, Kandel wishes to search for a common ground between the perspectives of learning theory and neurobiology. He speaks of "a molecular alphabet of learning" and "a basic molecular grammar underlying the various forms of anxiety" (Kandel 1983, 1282).

It should not surprise us when empirical research like this is forged into a philosophy of mind and a philosophy of psychiatry. In fact, in 1998 Kandel himself published an article with the challenging title "A New Intellectual Framework for Psychiatry." It summarizes the current thinking of biologists about the relationship of mind and brain and reads like a comprehensive philosophy of neuroscience and psychiatry. Kandel expresses his basic tenets in five principles. The first is that "All mental processes, even the most complex psychological processes, derive from operations of the brain. The central tenet of this view is that what we commonly call mind is a range of functions carried out by the brain. As a corollary, behavioral disorders that characterize psychiatric illness are disturbances of brain function" (Kandel 1998, 460; Labooy 2002, 33). The presence of a physicalistic, reductionistic frame of mind is apparent here. Kandel would fit well into the range of NRP theorists. Although we are not compelled to yield to his metaphysics of physicalism, we do need to account for these kinds of empirical data. Contemporary neuroscience reveals that neurobiology constitutes a very important part of our behavior and psychology: our ordinary desires all have a neurobiological substructure, and our behavior is firmly rooted in our biology. How are we going to account for freedom *and* this sort of neurobiological determinedness?

A Neurobiological Prison

Having touched lightly on the wealth of research in contemporary neuroscience and biological psychiatry, let us return to a conceptual analysis of freedom. Pivotal to my analysis of freedom was the insight that limitations to our actions are not yet limitations of the will. Formal freedom is just not affected by constraint. Let us apply this Scotistic tool to the intertwined mental and neurobiological realm.

We often acknowledge our desires and wishes. Sometimes, however, we feel that they have enslaved us. To quote Paul: "For that which I do I allow not: for what I would, that do I not; but what I hate, that do I" (Romans 7:15 KJV). To translate this passage into terms of current neurobiology, Paul admitted that the causal dispositions of neurobiology became a sort of prison to him. But we can see that neurobiologically prompted mental limitations are not yet limitations of the will, analogous to the case of the prisoner: the limitation to his actions was not yet a limitation of his will. Evidently, Paul might as well have assented to that which he hated. To put it another way, mental constraints are not yet volitional constraints. The crucial point is that our mental dispositions, closely linked to neurobiology as they are, constitute a dynamic force that we commonly avow but sometimes dislike. Disliking them does not mean that we can always oppose them successfully. However, drawing the conclusion that we are therefore unfree lacks conceptual precision. The human experience of constraint does not affect our formal freedom. It only shows a lack of *material* freedom in that particular situation: we cannot effectuate a certain state of affairs *p*. Would anyone dispute the human ability to oppose or accept a particular habit of mind?

Let us draw some implications. In the human ability to oppose or accept a particular mental habit, the difference between formal freedom and mental processes manifests itself. Mental processes, although they may give the impression of being the bedrock of freedom, are not to be identified with formal freedom. On the contrary: mental habits such as being suspicious are dispositions. The difference from formal freedom comes to light when we ask ourselves whether we are going to accept or reject a certain way of thinking or mental habit. This goes even further: not only mental habits but mental or conceptual activity as such must be distinguished from formal freedom. Our intuitive identification of conceptual activity on one hand and freedom on the other is shattered once and for all when we realize that formal freedom involves an unrealized synchronic possibility—that is, to will *–p*. Of course, unrealized possibilities are in no way part of conceptual activity, although our conceptual activity, *if* we had willed the alternative *–p*, would certainly have been involved. But it was not, because we did not will *–p*. Thus, mental or conceptual activity does play a role in formal freedom, but we cannot describe formal freedom *in terms of* conceptual activity, because it involves unrealized possibilities.

Let us face a common objection. According to common sense and our analysis of formal freedom, Paul is free in his decision either to fight his enslavement while anticipating his deliverance or to accept his concupiscence (Romans 7:8). A compatibilist could argue that even this kind of freedom is determined and therefore illusive. This opponent might argue something like this: "You might invoke the concept of formal freedom, and, admittedly, it all fits in very well, but how do you know that it actu-

ally exists? What proof do you have that reality is like this? What makes you think that formal freedom is not triggered by neuronal processes we cannot control?" To my mind, the odds turn against this reasoning, and the burden of proof is on the compatibilist. For the strength of compatibilism is not that it aligns with common sense; it surely does not. According to common sense, we really have a choice of our own in situations of internal conflict like Paul's, and our dignity as human beings is bound up with this genuine ability. To my mind, therefore, compatibilism is just a provisional solution for the riddle of determinism. It only attains some probability when we are impelled to yield to determinism, for example when formal and material freedom are confounded and, consequently, real freedom seems to dissolve in the face of the experience of constraint. However, if we are able to explain the common experience of addiction by distinguishing between formal and material freedom, the burden of proof is on the side of compatibilism. We should be realistic, like Paul: we cannot change ingrained habits overnight. But whoever declares that we cannot even rise to the *virtue* of not willing them is under the influence of philosophical misanthropy.

A Neuroscientific Test Case: Obsessive-Compulsive Disorder Research

We have applied the formal/material distinction to the area of mental dispositions, to mental habits with their underlying "basic molecular grammar" (Kandel 1983, 1282). And, thanks to the research of Jeffrey Schwartz (1999, 115–42), we are in the fortunate situation of being able to apply these Scotistic tools to empirical research even more thoroughly.

Schwartz directed research on the phenomena of obsessive-compulsive disorder (OCD). To give an example of this mental disorder: Some persons cannot avoid thinking of the possibility that their hands are badly contaminated. So they constantly wash their hands. They may be able to suspend such compulsive thoughts for short periods of time, but only with tremendous effort. Then their thoughts return inexorably to that one obsession.

Like Paul's afflictions, this condition can be analyzed with the help of the distinction between formal freedom and the factual mental inclination. The obsessive thought pattern is a good example of a mental disposition. This mental disposition is firmly rooted in neurobiological dispositions, as neuroscience has found. In OCD, the *direction* of the mental process is disturbed insofar as it is obsessively fixated. Yet, although the patient is factually or virtually unable to direct her thoughts elsewhere, she can still *will* it formally. As a human being gifted with formal freedom, she must choose between rejecting her obsession or trying to settle for it. Of course, if she chooses to reject it, the redirection of her thinking is (virtually)

ineffectable. This does not affect the fact of her formal freedom, however, just as the impossibility of escaping from Alcatraz does not affect the formal freedom of the unfortunate prisoner.

There is, however, a surplus value of Schwartz's research on OCD, because it confirms our theory of freedom in two ways. First, in Schwartz's research emphasis is placed on the importance of the will in the therapeutic process, and second, Schwartz traces the effects of his patients' wills on their neurobiology.

In his research, Schwartz discovered that OCD is associated with the disorganized neuronal circuits of the basal ganglia, a particular part of the brain stem. However, patients trained in alternative behavior can begin to 'put' new neuronal circuits in place. Evidently, this requires great effort, for patients are overwhelmed by a tremendous, unspecified anxiety, which they formerly contained only by submitting to the urge to wash their hands. In the behavioral therapy developed for this class of patients, the will plays a key role. Schwartz speaks of the *volitional modulation of cerebral function*. He studied the mental dispositions with their underlying neuronal circuits involved in OCD, yet he held that persons remain capable of redirecting their thoughts through sheer will power, even if that means initially having to swim against the tide of the mental disposition. This ability is exactly what Schwartz's team targeted in the therapeutic process. Over time, the alternative line of thinking and acting generates a new neuronal circuit, so that the healthy reaction sought by therapy becomes progressively easier. These changes were also measured neurobiologically (Schwartz 1999, 124). Our conceptual analysis with its linkage of dispositions and freedom provides a solid conceptual basis for this neurobiological and clinical research in the field of OCD. The new way of thinking, initiated by formal freedom, finally results in new "wiring"—new neuronal circuitry in the basal ganglia! Schwartz's basal ganglia and Scotus' basal analysis of freedom go hand in hand.

Conclusion

I have argued that the Scotistic distinction between formal and material freedom is pivotal in analyzing the problems of neurobiology and freedom. Using these concepts, we are able to account for both freedom and dispositional causality. Denying neurobiological dispositions that drive and sometimes even enslave us would be sheer blindness. However, concluding on the basis of neurobiological constraint that we are unfree is simply not justified, for then we confound formal and material freedom. Thus, I support a combination of freedom and lawlike causation that differs crucially from compatibilism in that it acknowledges formal freedom as the ability to will or not to will a certain state of affairs, regardless of whether it can be effectuated. This formal freedom constitutes the kernel of the human will and is central to the development of a philosophical

anthropology (see Labooy 2002). This legacy of medieval analysis, stemming from the attitude of *credo ut intelligam*—"I believe so that I may understand"—was fruitfully applied to contemporary philosophy of neuroscience.

The first universities developed out of the medieval paradigm of "faith seeking understanding." Since the Renaissance, in increasing intensity, science has developed a new, self-sufficient, often even antagonistic concept of self-identity. In this essay, however, concepts stemming from the Christian tradition of faith seeking understanding have deepened our comprehension of the results of contemporary science. Faith sparked Scotus' key concepts and modal innovations—tools used here for a thorough and consistent analysis of the neurobiological dilemma, a dilemma hitherto mostly "resolved" by yielding to determinism and compatibilism, a priori persuasions not normally acceptable to common sense. My linkage of Scotus' and Schwartz's basal analyses is meant to aid the gradual restoration of the old basal paradigm of the relation between faith and science: *credo ut intelligam*.

NOTES

1. Obviously, compatibilism could be linked with other brands of determinism as well, including theistic determinism. The Scotistic analysis I propose is of major importance in the construction of an alternative to these deterministic views as well.
2. Elsewhere I have developed a more precise concept with the help of possible world semantics. See Labooy 2002, chap. 4.
3. More on this in the next section.
4. This does *not* amount to Arminianism, that is, the thought that our free choice is a sufficient condition for our conversion; for, although we are formally free to will perfect obeisance to God, we are not materially free to do so. In this dispensation, as sinners, we cannot effectuate this formal freedom without God's grace.
5. The concept of material freedom concerns the presence or absence of a limit to the possibilities for action in a particular possible world. See Labooy 2002, chap. 6.
6. "Even though he is no longer free to do what he wants to do, his will may remain as free as it was before" (1982, 90). This is an important insight, which can be corrected, clarified, and integrated by our Franciscan position: corrected and clarified, because Frankfurt's position is neutral with regard to determinism. Associated with this is the fact that Frankfurt does not succeed in clarifying just what *volition* or *free will* is.

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