

***The Science of Non-action* [symposium review by Malcolm Williamson]**

Symposium on *Intentional Inhibition: from motor suppression to self-control*. Hosted by UCL Institute of Cognitive Neuroscience, 25 September 2013.

[I]t is an act of inhibition which comes into play when, for instance, in response to a given stimulus, we refuse to give consent to certain activity, and thus prevent ourselves from sending those messages which would ordinarily bring about the habitual reaction resulting in the 'doing' within the self of what we no longer wish to 'do.' It follows that the putting into practice of the theory of non-doing where the manner of use of the self is concerned is a fundamental experience, and is the most valuable experience to be gained by those who wish to learn to prevent themselves from harmful 'doing' in carrying out activities outside themselves. Such prevention is the form of non-doing which is essential to the changing of bad habits and to the control of human reaction. (*F. Matthias Alexander*)¹

'If you don't know what to do, the sensible thing is not to do anything.' (*Patrick Haggard*)

This event was the culmination of an international project funded by the European Science Foundation into the study of voluntary or 'intentional inhibition' – 'the ability to withhold an intention at the last minute based on internal experiences' – a phenomenon that Alexander teachers are practical experts at but share the common lack of theoretical understanding of. The project was initiated by **Patrick Haggard** (Institute of Cognitive Neuroscience, UCL)[2], whom many teachers will have met when he gave a talk to the profession in November 2004. His interest follows on from the work of Benjamin Libet and the moment of consciousness when one can veto one's intended action by exercising a capacity for 'free won't' at the last possible moment.[3] (Students of the Alexander Technique will be reminded of Alexander's instruction of 'mentally saying *No*'. [4]) In this review, I briefly discuss some of the contributions made.

As Professor Haggard explained in his introduction, intentional inhibition is about the moment when we think better of sending the angry email to our boss. Just in the nick of time that inner voice of reason and self-control saves us from our actions. The big question is: where does that 'voice' come from? There is obvious *valence* (feelings of like or dislike) associated with intentional inhibition: external influences of remembered parental reproach, friends' disapproval, legal sanctions, etc. But, rather than being a reaction to external suppression, the decision to stop is self-generated and overrides actions that have been triggered by more remote goals (such as our desire to confront our boss's unreasonable demands). The decision not to act requires 'freedom from immediacy of the situation'. The capacity for foresight was discussed in the afternoon by Anastasia Christakou (University of Reading).

Given that this was, after all, a conference on neuroscience, there were a lot of fMRI (functional, as opposed to anatomical, Magnetic Resonance Imaging) brain scans to be marveled at. These showed an increase of beta rhythm activity in the lateral motor strip and right medial frontal cortex of the brain when we are deciding not to act. There were numerous references to the brain regions of the pre-supplementary motor area (pre-SMA), inferior pre-frontal gyrus (IFG) – particularly the right side – and the substantia nigra (StN).

The problem for science with the 'top-down' model of inhibition, in which the aforementioned brain regions send out negative signals, is that dualism creeps in through the back door: a sort of 'mini me' (homunculus) inside our head seems to be telling us to stop. The alternative 'bottom-up' model is that activation happens when the fluctuating strength of 'go' signals in the motor system exceed a certain critical threshold level and so take effect. Again, this second model is not without its critics. The truth probably lies somewhere in-between. **Adam Aron** (University of California) commented that we are not dealing merely with pre-frontal cortex talk-down. Neither can we make an absolute distinction between an internally driven 'stop' and outside influences such as our consideration of the bad consequences of giving in to an impulse.

Arko Ghost (University of Zurich) explained the fundamental nature of inhibition. The voluntary generator is intact and comes back once inhibition is removed. The classical definition of inhibition was coined in 1883 by T. L. Brunton: 'By inhibition we mean the arrest of the functions of a structure or organ, by the action upon it of another, while its power to execute those functions is still retained, and can be manifested as soon as the restraining power is removed'.^[5] Inhibition is, therefore, not the extinguishing or restraining of a signal to act by some antagonistic force, but rather the imposition of an influence that prevents (inhibits) the 'go' command from being expressed while that influence is maintained. Adam Aron made the point that 'braking' only happens when a thing is moving. You must have decided to go ahead and act in the first instance and then decided otherwise and applied the brake for inhibition to occur. Again, Marcel Brass (University of Gent) said that intentional inhibition refers to a situation when the individual decides not to follow through and to cancel the intention at the last moment. There was the possibility that one could have acted otherwise.

Roy Baumeister (Florida State University) explained that the role of intentional inhibition in self-regulation or control was essentially to do with overriding responses and stopping unwanted behaviours: eight out of the ten Old Testament Commandments begin with 'Thou shalt not'. The golden rule – 'Do unto others as you would have others do unto you' – is superseded by the 'platinum rule': 'Don't do to others that which you would not have them do to you.'

Baumeister talked about Ego Depletion Theory – that when we are tired or 'depleted' we are less able to respond to stimuli in a reasoning way: less able to inhibit. Decision-making is more biased and impulsive and we are less able to take the initiative (actively respond) and we perform worse in tasks such as making choices and intelligence testing. Intentional inhibition works like a muscle. When the faculty gets tired it tends to conserve its energy; but this can be re-stimulated when urgent situations demand recruitment. And, like a muscle, it can be strengthened by 'exercise', character building and increased stamina – the 'cold shower every morning' approach advocated by our Victorian forebears. The average person spends 3–4 hours a day inhibiting urges and desires, and resistance to temptation gets weaker throughout the day.

What does depletion feel like? When we are depleted, then we are less able to keep anxiety at bay or to inhibit distracting thoughts – 'If I don't do well my life will be ruined and I'll disgrace everyone in the world that I hold dear!' Emotions feel stronger; sharks are scarier and puppies are cuter. Regulating our thoughts feels like effort (it takes something out of you) and we are less able to resist temptation (e.g. the 'trap time' to eat yet another chocolate cookie is greater in depletion): resistance weakens, desires intensify. There are differences between individuals – some are better at inhibiting than are others – and capacity fluctuates.

And how do you restore ego depletion? Well, you give yourself a dose of glucose (a sugary drink), or think about your posture. A group were asked to think regularly about standing up straight for two weeks, and endurance testing in hand grip and ability to withstand pain (hand held in ice-cold water) improved.^[6] Dr Baumeister said that another group was asked to take more care in speaking, to say 'yes' not 'yeh', 'no' not 'nah': this produced similar improvements!

Julie Duqué (Université Catholique de Louvain) talked about the mechanisms of inhibition for action. Our environment presents us with many options and inhibition is mainly a matter of selecting which course to take. Behavioural problems are caused by a lack of inhibitory mechanism in the brain. There is a hierarchy of processes: PERCEPTION (sensory) – COGNITION (pre-frontal cortex) – ACTION (motor). The cognition modulates both perception and action. There is evidence to show that there are two forms of inhibition: inhibition at spinal (pre-motor) and sub-cortical levels. At the lower level, inhibition deals with 'competition resolution', i.e. helping to select from an array of competing signals. At the conscious level the focus is on 'impulse control': Shall I or shan't I; 'go' or 'no go'?

Marcel Brass showed a YouTube clip of a head-butting incident from the 2006 FIFA World Cup Final. One delegate thought this was, in fact, not an example of a *lack* of intentional inhibition and I tend to agree. The perpetrator, Zidane, can clearly be seen deliberating with himself before he makes the

decision to retrace his steps and head-butt the opposing team's player in the chest. Decide for yourself: <<https://www.youtube.com/watch?v=W-KCbGAZRPO>>.

Brass discussed relevant studies and problems such as getting subjects to report accurately when they make a decision and the choice of optimal control conditions (what tasks to set subjects). The stimulus that triggers inhibition is usually internally driven but success depends on the balance between the strength of external stimuli and the internal desire not to react. Environmental, past history and intentional factors all influence a decision. His studies identified the dorso-medial pre-frontal cortex as the brain area where both actions and emotions, such as aggression, are inhibited.

Anastasia Christokou was unusual among the speakers in that her work was not focused on the detail of neuroscience but rather explored how people behave in daily life. Important for everyone is the development of foresight for making decisions about actions that take account of one's future welfare. She discussed structural and functional differences between the adolescent's and adult's brain across aspects such as memory, attitudes to risk and 'delayed gratification', novelty-seeking, exploratory behavior, and attitudes to success or failure.

The presentation opened with a quote from Lewis Carroll: 'It's a poor sort of memory that only works backwards.' The past is reconstructed but the future is manufactured. You need to 'see' your goal or you cannot act and, in general, as every parent who has tried to persuade their child to eat up their greens knows, you need to appreciate that a future goal has benefits and is worth attaining. Goal-directed foresight requires inhibition in your current state. You must stop; learn to stop; want to learn to stop; and learn to want to learn to stop (inhibit)! Is this why it's so difficult to persuade new pupils to do their regular semi-supine lie down, I wonder?[7]

I had to leave early to catch my train and so missed the final speaker **Alex Munchau** (University of Amsterdam) on *Tourette syndrome – a disorder of deficient inhibitory control, or the brain's response to over-regulation?*

Overall impressions

It was an impressive and truly international gathering of some 120 delegates. I spotted at least seventeen Alexander teachers among the audience. The organizing secretary had been worried that we might have been put off by all the neuroscience. But, as I left, I thanked her for the day and told her how refreshing it had been to learn a bit about the theory when our day-to-day focus is so much on the practicalities of getting our students (and ourselves) to stop.

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Notes

¹ F. Matthias Alexander, *The Universal Constant in Living* (London: Mouritz, 2000[1941]), p.101.

² Elisa Filevich, Simone Kühn, and Patrick Haggard, 'Intentional inhibition in human action: The power of "no"', *Neuroscience and Biobehavioral Reviews*, 36/4 (2012), pp.1107–1118.

³ Benjamin Libet, *Mind Time: The Temporal Factor in Consciousness* (Cambridge, MA: Harvard University Press, 2004), p.137.

⁴ F. Matthias Alexander, *Man's Supreme Inheritance* (London: Mouritz, 1996 [1910]), p.136. The phrase first appears in the 1918 edition of *MSI*.

⁵ Quoted in Solomon Diamond, Richard S. Balvin and Florence Rand Diamond, *Inhibition and Choice* (New York: Harper & Row, 1963), p.7.

⁶ Mark Muraven, Roy F. Baumeister, Dianne M. Tice, 'Longitudinal improvement of self-regulation through practice: building self-control strength through repeated exercise', *Journal of Social Psychology*, 139/4 (August 1999), pp.446-57.

⁷ In her presentation, Dr. Christokou also covered: Plato's charioteer and horses (passion and reason) – 'cortical control versus subcortical affective drive'; temporal discounting: 'would you take £10 now or wait six months and receive £100?' – delayed gratification.