

Reflexive and automatic violence: a function of aberrant perceptual inhibition

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Summary

It is commonly assumed that psychiatric violence is motivated by delusions, but here the concept of a reversed impetus is explored, to understand whether delusions are formed as ad-hoc or post-hoc rationalizations of behaviour or in advance of the actus reus.

The reflexive violence model proposes that perceptual stimuli has motivational power and this may trigger unwanted actions and hallucinations. The model is based on the theory of ecological perception, where opportunities enabled by an object are cues to act. As an apple triggers a desire to eat, a gun triggers a desire to shoot. These affordances (as they are called) are part of the perceptual apparatus, they allow the direct recognition of objects – and in emergencies they enable the fastest possible reactions.

Even under normal circumstances, the presence of a weapon will trigger inhibited violent impulses. The presence of a victim will also, but under normal circumstances, these affordances don't become violent because negative action impulses are totally inhibited, whereas in psychotic illness, negative action impulses are treated as emergencies and bypass frontal inhibitory circuits. What would have been object recognition becomes a blind automatic action.

A range of mental illnesses can cause inhibition to be bypassed. At its most innocuous, this causes both simple hallucinations (where the motivational power of an object is misattributed). But ecological perception may have the power to trigger serious violence also – a kind that's devoid of motives or planning and is often shrouded in amnesia or post-rational delusions.

utilization behavior / automatic action / ecological perception / violence / delusions

As part of an observational experiment, two patients were invited (separately) into the apartment of their doctor (the investigator). The patients were to be exposed to a few tableaux (a made bed, a sideboard laid out with food etc.) and their behavior, which was already known to be bizarre – was recorded. One of the patients, a 52-year-old house-wife, was presented with was a syringe and vial of saline. Without hesitation, she drew the saline and attempted to give the doctor an injection.

The other patient, a 51-year-old male engineer, was presented with a painting sitting on the ground. A hammer and nail were nearby. The patient used the tools to hang the painting. The patient was led into a bedroom. He stripped and hopped into bed. A gun lay out on a table-top. When the patient spotted it, he headed to it with an expression of sheer delight. The patient picked it up and spun the barrel. There were no cartridges, so he searched the room until he found some, then he loaded the gun... and the experiment had to be called off. The doctor had to intervene to confiscate the weapon. The patient was not angry, he had no prior homicidal intentions but would have had no choice but to shoot the doctor just as the woman has no choice

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but to inject him with saline. It was as if the gun was 'telling' the man to shoot [1]. Neither patient suffered delusions because they lacked the self-reflexive criticality required to consider their actions. What they did experience, however, were simple 'non-bizarre' hallucinations. Somehow, these inanimate objects embodied enough authority to motivate action: instructions to act emerged spontaneously as both thoughts and actions when the patients were exposed to the excitatory presence of objects.

This anecdote illustrates a significant problem with the current definitions and models of violence. Violence is defined as 'human aggression is any behavior with the... intent to cause harm. In addition, the perpetrator must believe that the behavior will harm the target, and that the target is motivated to avoid the behavior... Violence is aggression that has extreme harm as its goal (e.g., death).' [2] Clearly, in the cases observed above, the imminent homicide was neither aggressive, nor violent. Indeed violent psychiatric acts aren't *compos mentis* (in right mind) [3, 4] and have no *mens rea* (intent) although the *actus reus* (criminal action) may be fluent and even performed in good humor. Not only is there no *mens rea*, but some psychiatric acts are innocent of intent, negligence or recklessness. They therefore don't fit current models of violence such as Anderson and Bushman's 2002 generalized aggression model (GAM - figure 1). This review does not focus on intentional violence, but opportunistic violence that is not driven by intention – whether rational or delusional.

Just as the GAM model is premised on intent, debate about psychiatric violence is also. Essentially the difference is cosmetic – there is still a general belief that psychiatric violence is intentional, the primary difference being that the intent is delusional or based on hallucinatory experience. A central motif of this kind of violence is the deific decree, which is a hallucination involving God's commands. Debate focuses on deific decrees partly because the delusion cited in the standard test case for criminal insanity in common-law countries was a delusion of this type (ie. M'Naughton, 1843) [5]. Other reasons for this focus include the relative comprehensibility of this type of delusion to people who do not suffer delusions. Finally also common – with grandiose delusions occurring in about 55 of a

sample of 1103 schizophrenic case notes [6]. But despite the prevalence of delusions and hallucinations in mental illness, delusions do not necessarily motivate the *actus reus* (criminal action). If it were, delusions of deific decrees should be considered similarly to any fundamentalist religious belief [5], meaning the 9/11 attacks and countless other acts of religious terrorism would be defensible by arguing that the perpetrators were non-*compos mentis*.

To date, there is no cogent and well-accepted hypothesis for the relationship between delusional *mens rea* and associated *actus reus*. Although delusory intentions hypotheses are relatively well accepted [eg. 7, 8], they are poorly developed and rely on the Cartesian logic that intent must precede action. But recent neuroscience doesn't support this hypothesis (see below), and furthermore, there is evidence that delusional patients don't act on their delusional beliefs [9]. The hypotheses for delusions that remain tenable are models that emphasize post-hoc explanations and post-experiential meta-logic [10]. These models suggest that delusions occur to explain actions and events that are otherwise inexplicable [11]. This is a parallel of Bem's self-perception theory: 'Individuals come to "know" their own attitudes, emotions, and other internal states partially by inferring them from observations of their own overt behavior and/or the circumstances in which this behavior occurs.' [12].

Delusional intentions are roughly classed thus: paranoiac-defensive narratives, where violence occurs in the belief that it is in self-defense. Grandiose and manic-delusional narratives are where violence is motivated by a swollen sense of self-empowerment or sense of entitlement; and altruistic narratives, where violence is regrettable, but believed to be essential for the greater good [8, 13, 14]. In these paradigms the delusory motivations for violence are considered to be a product of psychiatric illness, but the mechanism that turns perception into *actus reus* are still unquestioned. In this paper, the case for violence as a direct product of perception is introduced by distinguishing post-rationalized delusions from delusional intentions. Post-rationalized delusions follow reflexive actions that are an intrinsic part of the perceptual process.

In any violence, the *mens rea* is normatively conceptualized as the point at which an action commences; the *actus reus*, a deliberate consequence with instruments and materials as 'tools' for action. The reflexive action model reverses this model by presenting the 'tool' as potentially being the trigger of an action that triggers and therefore precedes delusional ideation. Here, the technology is not just a means, but part of the very hallucinatory experience that drives delusional narratives.

THE BACKGROUND: AUTOMATIC PERCEPTION

There is a long history of debate about how people (and animals) perceive, and models abound. I refer readers to some of the literature, but will not enter the debate in this paper. For reviews on the many models and their strengths and weaknesses, see [15-17] and perhaps a text book also. Instead, this article hypothesizes about the implications of the ecological theory of perception (one of the prominent theories of perception), when applied to the question of intrapersonal or self-inflicted violence. The ecological theory of perception is not always useful for understanding perceptual phenomena – in particular it has a weakness when it comes to perceiving unrecognizable phenomena [18]. Despite this weakness, the theory has demonstrated strengths for understanding how recognizable objects and opportunities are identified [18 (Peer commentary) [19-21].

The concept of ecological perception is that objects and opportunities are recognized by the actions they enable. An object is recognized by the thoughts that commence as part of the process of perception; once it is familiar, a syringe is not recognized by its color or shape – it is recognized by impulses that revolve around the potential opportunities it enables. Equally an apple says eat me [19], and as demonstrated above a gun says shoot me. In humans and animals with well-developed frontal cortices, these impulses are not always acted on because of an inhibitory reflex prevents action from being automatic. This reflex is primed by the social context and the milieu [22]. A useful term for contextual inhibition is found in foundational environmental psychology literature: it is the behavior set-

ting – a concept first articulated by Barker and Wright [23].

In the ecological theory of perception, perception is not understood as a cognitive process, but as a management system for desire and action - it is thus visceral not intellectual. It is a stab of hunger or a proto-desire for a taste that causes the recognition of food – not a cognitive analysis of available sense data. This means impulses will progress into action unless inhibition is maintained. In healthy people and more evolved animals, decisions are made at the moment of recognition whether to engage and accept the impulse as a declarative desire, or to ignore it and choose another course of action altogether. Impulses are limited by context (the behavior setting, and further by choice). But in a number of conditions including hypofrontality, inhibition is weak, choices are not made and actions are thus automatic [24, 25]. Simple creatures that have no frontal cortex have no choice but to act according to their perceptions [20].

Behavior is inextricably related to opportunities, even from an evolutionary perspective [21]. Objects that contain such opportunities and thus demand action are called affordances [19, 20].

Neither behavior settings, nor affordances appear in isolation. Just as perception is continuous, so too are affordances [16]. All animals engage in affordances because they are always on the lookout to recognize them. One is connected to another in series, and likewise behavior settings are connected similarly. Affordances build on one another. In the study above, the doctor was a natural complimentary affordance to both the syringe and the gun – His status changed from doctor to patient or target only once the syringe or gun had been automatically engaged with.

Reflexive violence is hypothesized to occur when the constant stream of action and thought (that we humans are continually engaged in) is completely co-opted by a series of automatic negative affordances. This will occur either in a behavior setting that allows such action, or when automatic inhibition is weakened - either by biological deficits or the disinhibitory effects of drugs or alcohol (it is well established that disinhibition is a common symptom of psychotic or biological conditions or substance abuse).

Deficits of perceptual inhibition

The patients with the gun and the syringe were showing symptoms of a spectrum of utilization behavior disorders, all of which erode personal autonomy. These are utilization behavior, imitation behavior and environmental dependency syndromes. In one study, these were found to be ubiquitous in cases of frontal lesions; 100% of the 29 patients with frontal lesions that were studied developed these behaviors to some degree [26]. 52% (n=15) of these patients developed utilization behavior, where engagement in affordances cannot be prevented, even against authoritative contrary instructions [27]. Other behaviors included environmental dependency syndrome which is where a patient depends on behavioral cues from the milieu [1]; and imitation behavior, where patients automatically imitate the behavior of others, (for example, if they are watching someone else putting on a pair of glasses, they will try to do so themselves, even if they are already wearing glasses [27]). Only one patient at the time of the study showed none of these syndromes, but he developed them three weeks after the study was complete. These syndromes, all bizarrely lacking in autonomy, are presumed to be caused by the excitatory presence of an affordance (perceived opportunity) when the inhibitory neurons of the frontal cortex have been severed [1, 24]. This makes the perception-action pathway automatic, and in extreme cases, functionally identical to the perceptions of primitive creatures, except for a much larger and expandable ontology, and therefore more programmed reflexive actions.

The utilization behavior spectrum disorders seem to occur wherever frontal connectivity is lost. The report of Lhermitte, Pillon [26] also identifies other conditions that sometimes cause utilization behavior – these include various other focal lesions, Parkinson's disease, progressive supranuclear palsy, Alzheimer's disease, and multiple vascular accidents.

Utilization behavior-like patterns are also common in non-biological psychotic conditions. These are more complex than biological lesions, and are thus not strictly speaking the same. In manic and psychotic disorders at least, the inhibition of perceptual stimuli appears to depend on the emotive nature of the stimuli, with percepts that have a positive affective bias being over-inhibited and affectively negative ones be-

ing extremely under-inhibited. This was found in a sample of 10 akinetic psychiatric patients, 10 more common psychiatric patients¹ and ten healthy controls. All participants were shown emotive images while undergoing fMRI scans of their frontal lobes. The emotional bias of the images was generic and indisputable, regardless of acculturation. Negative pictures included things like a mangled face, positive ones a happy baby. A neutral condition was also added – it was a piece of grey card [28]. Among other findings, it was noticed that in the negative condition healthy controls showed equal inhibitory and excitatory activity, thus cancelling each other out. Psychiatric patients, on the other hand, showed very low levels of inhibitory activation relative to neural excitation for negative stimuli, thereby replicating utilization behavior spectra conditions, albeit specifically in circumstances that are charged with negative emotions [25]. Thus patients with schizophrenia and bipolar disorder may also present with automatic and uncontrollable behaviors, but only when the objects of perception are seen as negative [25].

It may be difficult to assess what constitutes negativity, but affective qualities are often relatively universal, despite the undeniable fact that subjective opinions are based on culturally encoded schemata. And different schemas will evoke different responses - if the 'object' of attention is situational, negativity may mean harmful, threatening or wrong. In a social situation negativity may be linguistically encoded, and communicated through words and deeds. Social expressions of negativity may include expressions of contempt, disgust, defensiveness, belligerence, dominance, stonewalling, anger, whining, sadness, tension or fear [29]. It's important to note that these affective cues are subtle and function on an automatic and precognitive level (if cognition strictly speaking plays a role at all), and thus may never be declarative. Social negative affect, for instance, is typically not declaratively noticed by participants, but can be identified by psychologists trained in the Specific Affect Coding System (SPAFF) [30]. Furthermore, with automatic actions, the time lag between

¹ The akinetic and catatonic patients included 7 with type 1 bipolar disorder, and 3 with a schizophrenia diagnosis. The patients with common psychiatric conditions included 7 with type-1 bipolar disorder, and 3 with paranoid schizophrenia.

impulse and action is virtually non-existent, as such automatic actions cannot be considered to be premeditated [31]. This is supported by the close examination of the psychologist's reports from a French courthouse, which recorded 210 homicides committed between 1975 and 2005. Of these 14 were identified as being potentially psychiatric. All were committed by schizophrenic patients, and all shared distinctive features; none of the 14 homicides appear to have been premeditated, all were committed alone, and all used available means (eg. bare hands) [14].

In a grounded study of 30 women in extremely abusive relationships, all reported that attacks appeared to occur unpredictably, suggesting that much domestic violence may also be unpremeditated. The caveat here is that both the author of the study attributes a motivation to this unpredictability; "Instilling the sense of fear that a physical attack is possible at any moment is one way battering men control their partners" [32]. Like the observations of Richard-Devantoy, Duflo [14], these attacks appear to be spontaneous and unpremeditated, because assailants 'mostly' used available means – victims were 'hit with objects such as telephones, lamps, chairs' [32]. To link these assailants to the psychiatric ones further, victims reported noticing symptoms that are characteristic of severe psychiatric conditions, such as "psycho eyes" and degraded speech patterns [32]. Abnormal eye gaze and is not useful for diagnosis of psychotic disorders, but they are sufficiently common that they have been the subject of many studies and are thus recognized as associated symptoms of schizophrenia. Degraded speech on the other hand, is a characteristic symptom of active phase schizophrenia [33].

Automatic triggers and delusional rationalizations:

If an affordance is charged with a negative affect, the threshold of reactivity (when proto-desires turn to unwanted actions) is increased radically in psychiatric conditions wherever inhibition is reduced. This doesn't need to be a symptom of a primary psychiatric disorder, however – it can equally be caused by substance abuse [34], and in reality substance abuse is single the most common factor of any violence outside of war [32, 35].

It appears that automatic actions somehow bypass whatever it is that tags a sense of self-agency (Schütz-Bosbach, Avenanti [36] suggests this may be cortical inhibition). This may be experienced three ways; as a hallucination, where the action-demanded by an affordance is misattributed [25]; as an episodic amnesia, where events cannot be remembered because they were never properly experienced; or as delusions because actions are concurrently or retrospectively rationalized [11, 37]; much the same way as individuals come to develop a self-identity based on their own actions, functionally as if they were outside observers [12]. Indeed, detailed first-hand accounts of paranoid schizophrenia sometimes provide insight into the retrospection involved in fostering delusions:

"A little girl said to her mother, 'Is that man possessed by the Devil Mummy?' Her mother also looked at me and replied, 'Yes dear.' This coincidence just when I was thinking this very thought, was enough to prove (it to me)... I had to make sense, any sense, out of all these uncanny coincidences. I did it by radically changing my conception of reality." [38].

Cases of amnesia may be more common than cases of delusions. In one London-based study complete or partial episodic amnesia was claimed in 20 out of 50 homicides. While this data may have been confounded somewhat by criminals who wish to avoid a guilty sentence, the high number is also reflected in various conditions that made such claims plausible; biological injury, psychosis and intoxication [39]. In some of these cases, the assailant handed themselves in, knowing they were prone extreme actions without remembering them.

Unlike the lady with the syringe and the man with the gun, the negative charge provided by the negative affordances and violence may provide an impression of deliberate purpose, but only after or during the act because the motivation to act was never intentional. It comes from recognition of the weapon or a victim that didn't exist earlier, yet actions are very convincing proof of intention even to the assailant. But sometimes no plausible motive can be found – or even hallucinated; these then may be amnesic;

'A young married man, following an enforced starvation of three days, murdered, for no reason, one of his children with whom he had been

on the best of terms. He had no memory of his actions' [39].

In May 2011, in Tenerife (the Canary Islands), a homeless man (presumed to be schizophrenic) grabbed a knife from a supermarket shelf, and spontaneously decapitated a nearby tourist. He was apparently unprovoked and his violence was almost certainly not premeditated. The only time the assailant had ever met the tourist before was just a few moments earlier. The victim had complained to a security guard about being harassed, and the assailant had been moved on. The assailant immediately returned to the supermarket and killed the tourist [40]. Although it is far from clear why the tourist was victimized, there's no doubt that her presence caused the assailant to become rapidly aroused. In this case, the convergence of the negative affordance suggested by the by the tourist (*'target me'*) and the no less horrific negative affordance suggested by the chef's knife, which was for sale in the supermarket (*'kill with me'*) came together in a particularly tragic way. The assailant's delusions must have implicated the tourist in a very specific way, because the he took her severed head out to the street and declared; *"I am God's avenger and I come to mete out justice!"* The delusional narrative that this quotation speaks to has a mythological quality – and draws on common culture, but nevertheless must have developed with – or after, the events it related to – it couldn't have developed earlier, because the assailant and the victim had never met.

Typically delusions are formed on layers of complimentary affordances, which have special (often encoded) meaning for the patient. These build quickly on themselves following a single line of logic that is either imperceptible or irrelevant to others [41]. These become delusional narratives, which leave little reasonable forensic evidence, even though they make complete sense of the circumstances to the patient [38].

Random homicides by psychotic strangers are very rare [42], and for this reason, data is poor, but in a cross sectional study of homicides between 1978 and 1983, 1418 homicides were analyzed and 108 were identified as having been committed by psychiatric patients. Of these only 19 (17.6%) of the victims were strangers. Obviously sudden and impulsive violence doesn't always involve strangers, but circumstances that

do involve strangers are more likely to lack any reasonable motive. Of the stranger homicides, 16 (14.8%) were utterly unprovoked [35]. Other evidence suggesting that violent impulses are somatogenic come from other cases where no reasonable motive can be found:

"...the couple were on the very best of terms. There had been occasional sexual intercourse and no major quarrels... On one occasion, for no apparent reason, he had seized her by the throat but had relaxed his grip without harming her. She had agreed to forget the incident and to continue their acquaintanceship. On the night of the murder they had spent the evening together listening to the radio at his home... As the girl rose to go he suddenly seized her by the throat and strangled her, placing the body under the bed and then notifying the police." [43].

"He was in love with the girl and wished to marry her... Having met the girl one evening to discuss marriage arrangements, he suddenly and without any warning felled her with a heavy piece of wood and stabbed her in the neck with his clasp knife." [43].

The events of the Tenerife homicide appear to be qualitatively similar, as all these cases (and many more) suggest that psychiatric homicides can occur by circumstance rather than choice. In many cases, the attack is not remembered by the assailant [39, 43]. And if events are remembered, what may appear to be a memory may in fact be a delusion or hallucinatory [44]. The Tenerife homicide may well be a case in point as the statement, *"I am God's avenger and I come to mete out justice!"* implies. This statement appears to match the assailant's actions (carrying the victim's head by her hair, while clutching a knife in the other hand), but not the assailant's intentions – because he clearly had none. Hallucinations are like a fire, kindled out of perceived events, opportunities and objects. The availability of a knife in the Tenerife case was not premeditated, and neither was picking it up. The opportunity to use the knife was also involuntary, even as a delusional narrative may have been growing during the quick series of tragic events.

The relationship between technology and action is direct. Even the most simple of animals perceive external objects as affordances, automatically triggering instinctive action. A barnacle drift in the ocean until it hits a hard surface

that it will then attach itself to [20]. A hard surface is a very limited form of technology, but as life becomes more complex, so too does the technology it can engage. The sea-eagle's uses stones to break egg-shells, and there are any number of animals that will make good use of a hollow tree. Obviously for humans technology is far more complex again, and human technology enables a potential range of affordances that may be either specific (such as a custom part of an engine), or incredibly diverse like a computer. But the complexity of human technology does not make it dissimilar to a surface for a barnacle. Once the meaning of the object is known to the point that its use is automated, it triggers action in very much the same way – although the barnacle has no capacity to reprocess information or to learn, and thereby cannot behave differently [20]. Choice is an evolutionarily advanced process, which given some conditions, isn't even ubiquitous in human-kind, much less in simple life. Thus technology, once its function has been learned, is part of the process of thought and action.

It appears that the knife used in the Tenerife homicide was not just a weapon. It served an important role in the psychological process that led to the attack. In premeditated violence, the technology involved is a tool that is chosen after a decision to commit the act of violence is made. This presupposes a motive and a desire to cause harm, which was clearly the case in Tenerife, where the alleged assailant had not met the victim so much as ten minutes earlier. But technology, firearms in particular, do trigger violence that otherwise would never have occurred, whether or not there is a psychiatric condition. In the USA, about 40% of the deaths caused by firearms are accidental and involve children or teenagers [45]. This should come as no surprise; automatic reflexive inhibition in the frontal cortex is low for children (8-10yrs) and lower still for adolescents (14-18yrs) [46]. A picture begins to emerge, where the perception of the opportunity that enables violence suggests violence. But more commonly, in cases of sudden psychiatric violence, the opportunity is not suggested by the weapon, but rather by the presence of a vulnerable victim. Violence of this sort is sudden, unplanned and direct – usually the attack is done with bare hands [3, 14, 35]. Although these

circumstances are more common, in either case – the violence emerges spontaneously from the perception of an opportunity.

DISCUSSION

The issue of violence is a broad subject, and only part of the whole problem will be caused by reflexive action. This part is expected to be quite small overall, although it is likely to explain most psychosis related violence. One of the features of schizophrenia and type 1 bipolar disorder is that deliberation becomes very difficult, as is reflected in the endless Wisconsin card sorting and Stroop tests that have been performed on schizophrenic patients [47]. The implication is that planning violent action will be difficult in this condition. Furthermore, the conditions that make reflexive action likely are present in these conditions [25]. Beyond this, becomes more difficult to further identify a group that suffers from reflexive violence, except to say that these symptoms are likely to be far more common in untreated psychosis, particularly first episode (about 80% of cases, in statistical meta-analysis), when insight is poor (about 40% of cases) and when associated with self-harm (approximately 90% of cases) [48].

Several etiological options are presented here that may give rise to reflexive violence. Of these, all are associated with reduced frontal inhibition, particularly when circumstances or communication are perceived as being affectively negatively charged. Analyses of specific forms of violence have been linked to cases of pedophilia, for instance, and in these cases at least, frontal lesions are clearly evident in positron tomography studies. But it is premature to assert causality. Pedophilia is a form of violence that is universally regarded as negative, offering some support for the reflexive action hypothesis, but this support carries no external validity and low numbers of studies and subjects mean that even internal validity is notional. Having said this, it is interesting to note that utilization behavior was found to be a common comorbidity along with all the paraphelias including pedophilia etc. [49].

Ultimately the greatest risk of reflexive violence is not for unknown victims, but for the patient themselves. The reflex to jump, when at a

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