Adaptation to the Suicidal Niche

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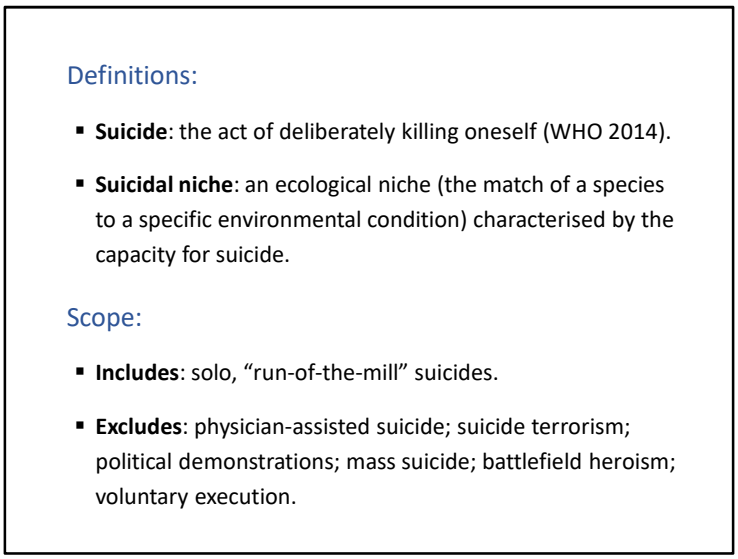
My title for this talk is "Adaptation to the Suicidal Niche." My proposal is that, wherever geographically in the planet we happen to be, we humans occupy a special ecological arena. It is an environment so hostile that we appear to be the only form of life that can tolerate it. The pre-eminent feature that characterises this niche, and is the primary threat that makes living in it so problematic, is the capacity for suicide. We are a species that is finely attuned to live with the potential deliberately to kill ourselves. I believe that we are so well adapted to this niche that it is easy not to notice that it exists, much like fish are supposed not to perceive the existence of water. Indeed I think it often serves us well not to notice, because our success in this niche requires a measured and variable degree of blindness to reality. In the face of chronic psychological pain, our survival may depend on tactical attenuations of normal cognitive functioning. For this reason I will argue that much of what we call psychopathology may not be diseases or disorders, but protective psychological mechanisms that keep us alive when we otherwise would have taken our own lives.



First I must define terms. Suicide for our purposes has its regular meaning: it is the act of deliberately killing oneself, the World Health Authority's definition (1). It is intentional self-killing. When I talk about the suicidal niche I mean to invoke the ecological implications of "niche", the relationship of a species to a specific environmental condition. In the suicidal niche, the outstanding condition is the potential for deliberate self-killing.

My remit is to discuss what could be called "run-of-the-mill" suicides (2), that is, solo self-killings. I am not planning to discuss any of a range of unusual and special cases, such as physician-assisted suicide; acts of suicide terrorism; public self-immolations and other political demonstrations; mass suicide; heroic deeds on the battlefield; voluntary executions, or suchlike.

The main topic we are going to discuss is a new conceptual framework for understanding suicide. It is what I call a "pain-and-brain" theory of the behaviour's evolution.

Importantly, it is also a theory about the evolution of defences against suicide. Defences which, I will argue, allow us to live and to thrive in the suicidal niche.

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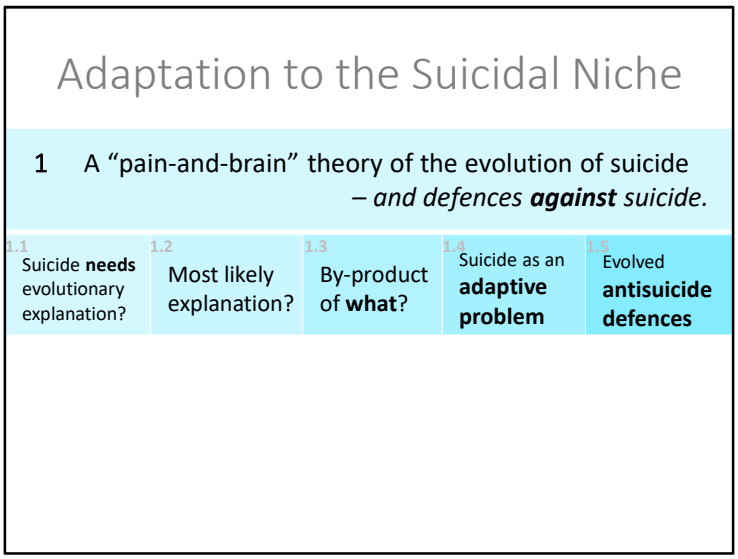
(1) W.H.O. (2014). *Preventing suicide: A global imperative*. Geneva, Switzerland: World Health Organization.

(2) Cholbi, M. (2017). Suicide. *The Stanford Encyclopedia of Philosophy.* Fall 2017. Retrieved from https://plato.stanford.edu/archives/fall2017/entries/suicide/

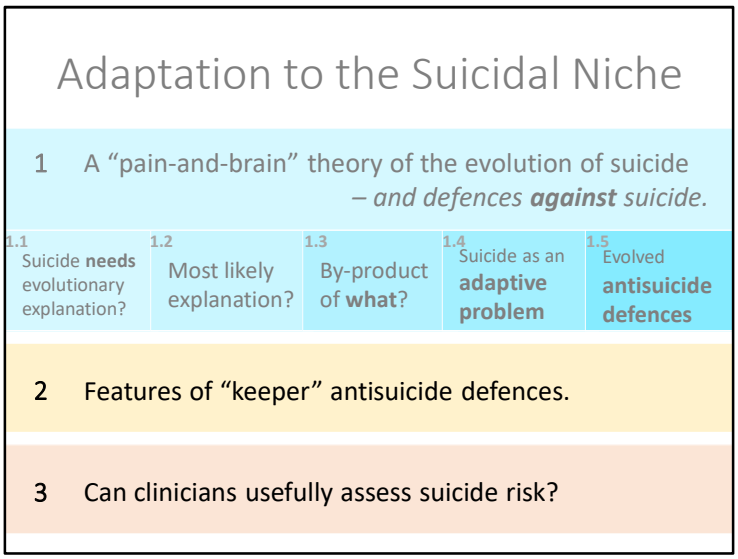


I will explain the theory in 5 stages, which are steps in a journey that I found myself taking in my research over the last few years. I am inviting you to join me as I retrace my steps.

First, we will need be clear that evolution is relevant to suicide, that it needs any kind of evolutionary explanation. I have come to the view that not only is evolution relevant; it is probably the key to making sense of the behaviour. I don't believe we can understand suicide except in an evolutionary context. Then we will ask, out of the few types of evolutionary explanation that are available, which is the most likely? I will suggest here that suicide probably arose not as an adaptation itself, but rather as a noxious by-product of some other trait that was adaptive in the evolution of our species.

But if suicide is by-product, then a by-product of what? What adaptation could have brought suicide in its wake? I will argue that the behaviour derives from not one but two adaptations combined: one is pain, which is a biological signal that demands that the organism take action to escape it; the other is the promiscuous intellect of the adult human brain, which opens up the possibility to answering that demand for escape by self-extinction. Hence, we can call this a "pain-and-brain" theory. Next we will face the difficulty that these "pain" and "brain" conditions seem to be not only necessary for suicide, but sufficient. Any animal that knew it could end its pain by switching itself off would be expected to do so. Suicide emerges now as an adaptive problem, and a grave one, in the evolution of the human species

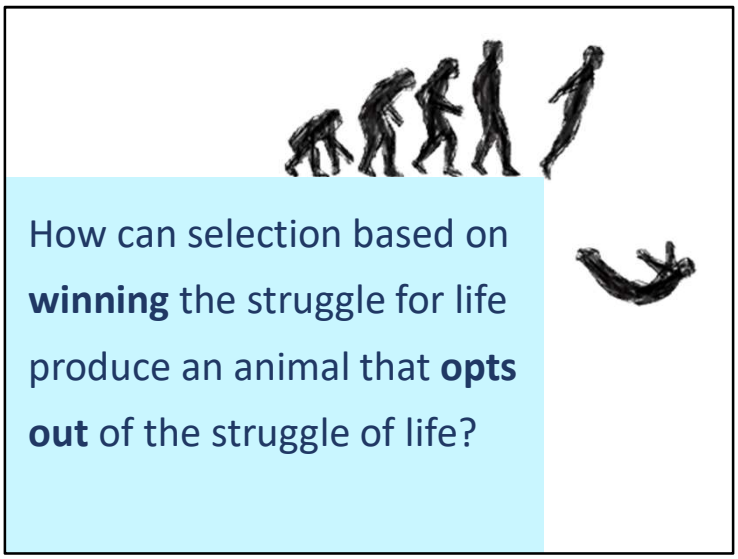
So finally, we will infer that antisuicide defences have evolved to address the problem. Based on what we can deduce from the adaptive problem, we will consider how these defences are likely to operate. I am hoping that, by the end of this section, I will have persuaded you that the suicidal niche exists and that, because of these evolved protections, we are specifically adapted to live in it.



We will have two more short sections towards the end of the talk. First, I will discuss some features of one particular class of defences, which I call "keepers". My expectation is that these features can be found in symptoms of depression, addictions, and several other psychopathologies, to the extent that I suspect many common mental disorders may not be disorders at all, but rather, orderly ways in which the organism blocks suicides that would otherwise occur.

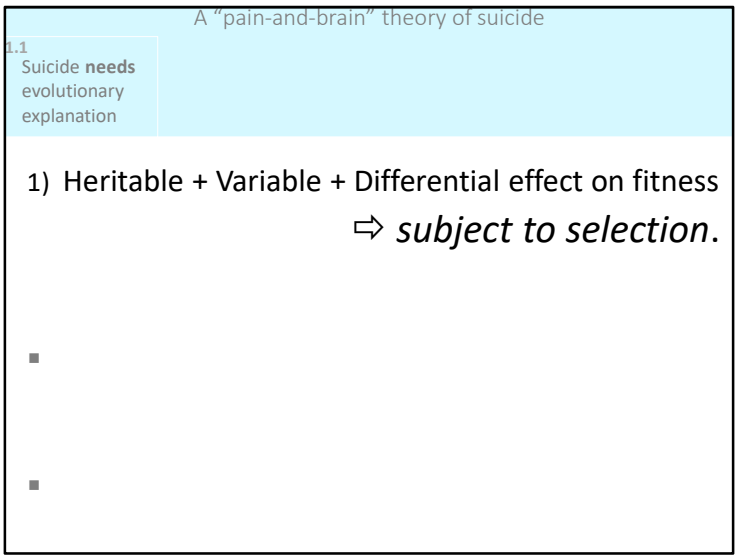
Finally I will raise one particular implication of the theory: the question of whether it is possible to predict suicides on a case-by-case basis with a useful level of accuracy. The theory tells me that suicides are intrinsically not amendable to prediction. In other words, they are predictably unpredictable. After that we will open up for discussion, and I look forward to your comments and questions.

So, to begin. Does suicide need evolutionary explanation? I think it does, for several reasons.



Suicide has long been viewed as a puzzle by evolutionists. On the face of it, it is bizarre outcome of natural selection. This drawing is not mine, and I am not sure where it is from, but I think it illustrates the strangeness of the situation rather well.

We could word the puzzle like this: How can selection based on winning the struggle for life produce an animal that opts out of the struggle for life? It is a riddle that calls for a solution.

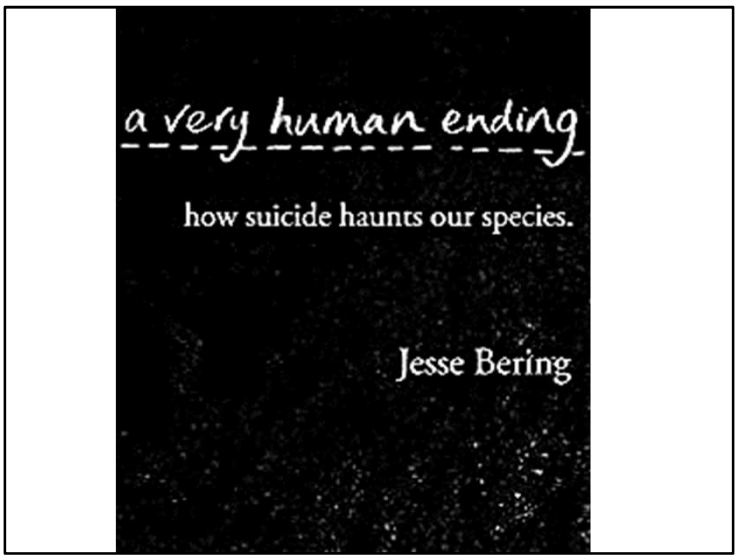


First, the behaviour seems to be heritable to some degree – it tends to run in families, and risk of suicide appears to have a genetic component.

And the risk also varies across populations: we find different rates prevailing in different cultures and countries.

And the act of self-killing would seem generally to have a strongly harmful effect on reproductive fitness. Most obviously, being dead is very bad for one's prospects of procreating. Suicide specifically is usually very bad also for any surviving kin, because of the special economic and psychological fall-out that usually follows.

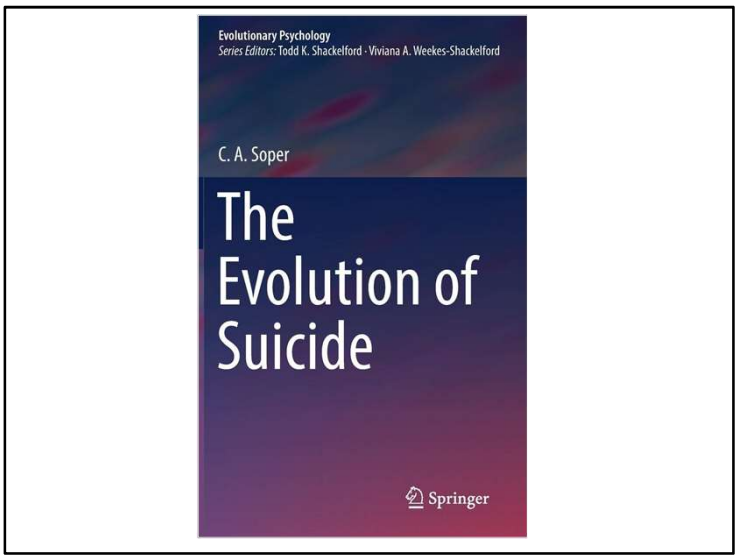
Now if we combine these three handles – heritability, variability, and a differential impact on fitness – we would expect a trait like suicide to be subject to selection. The offspring of the less suicidal should be powerfully favoured in the struggle for life, a pressure which ought to drive the behaviour out of the population. But clearly, selection had not done this, and we need to understand why.



Second, suicide is probably unique to our species. There is no evidence, no reliable scientific evidence, that any other animal intentionally kills itself.

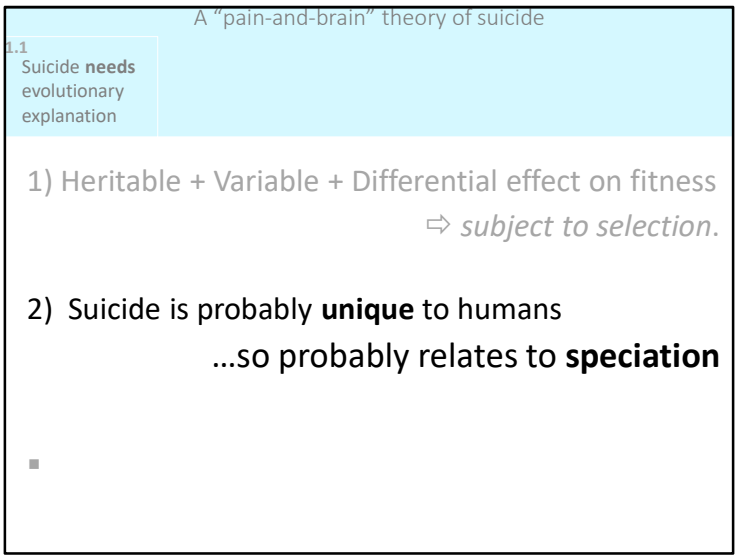
A book was published last year, by the evolutionary psychologist Jesse Bering, that discusses this point. It is a good read. As the book's title, Bering describes suicide as "A Very Human Ending". Experimentally, it would be possible, in principle, to observe other animals deliberately killing themselves, and scientists have indeed looked for evidence of such behaviour for a long time. But an absence of evidence remains.

Bering, J. M. (2018). *A very human ending: How suicide haunts our species*. London, UK: Transworld.

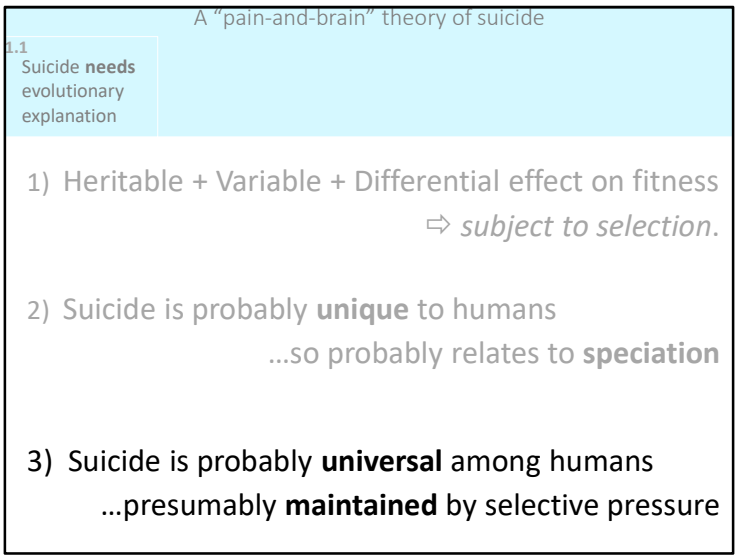


But I believe that the case against nonhuman suicide is stronger than just an absence of evidence. I argue in my book that there are principled reasons to doubt that any nonhuman would be capable intentionally of killing itself. We will come back to this.

Soper, C. A. (2018). *The Evolution of Suicide*. Cham, Switzerland: Springer.



The point for now that if, as it seems, only humans suicide, then it tells us that the phenomenon probably emerged at some point after our species diverged from other primates. If we want to understand suicide, then, we need to understand something of the process of speciation that presumably brought it about.

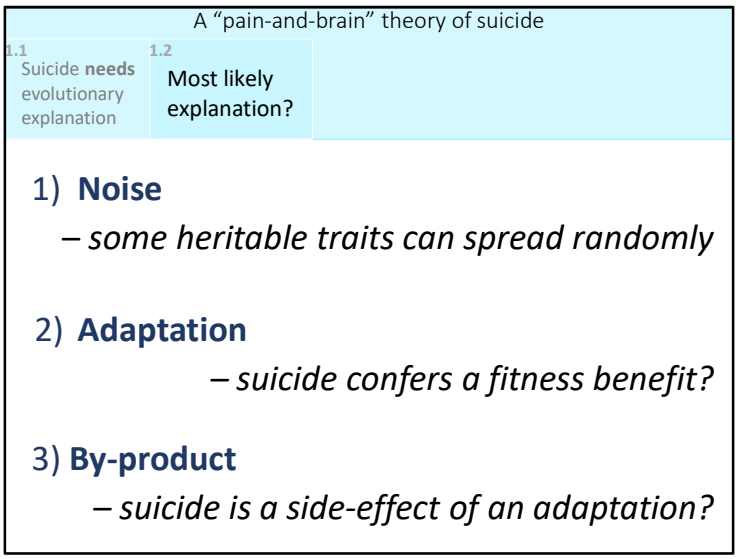


Third, and finally, suicide appears to be universal across the human species, or virtually so. As far is it possible to say, there is no time in history and no sizeable human group that is or was entirely free of the trait. Where suicidality cannot be observed directly today, its fresh footprints can be seen in virtually universal stigmas and strictures against it: as Durkheim pointed out, presumably there would be no need for such proscriptions unless there had been a problem.

Now this universality extends to hunter-gather tribes and preliterate cultures, which suggests that suicide is no mere product of modern lifestyles. Rather, it was probably part of the make-up of the earliest modern humans, and it migrated with them out of Africa some 70,000 years ago. Importantly, in those intervening millennia, despite the extreme fitness cost of deliberate self-killing, selection does not appear to have eradicated the potential for suicide among any of us, or virtually any of us, groups that descend from these original migrants. This is interesting because selection works against any trait that has no value. Useless characteristics, like the legs of snakes and the tails of humans, tend to disappear. Suicide has not disappeared, and there is no evidence that it is heading in that direction.

The conclusion is that pressure of selection has not just tolerated suicide, but has actively maintained the behaviour in our species, for some reason. So next we need to ask, what is that reason?

Durkheim, E. (1897/1952). *La Suicide* (J. Spaulding & G. Simpson, Trans.). Henley, UK: Routledge.



What is the most likely explanation for suicide not disappearing from the human gene pool? Well there are only three explanations available, because there are only three known ways in which any heritable trait can transfer across generations. It can propagate randomly, as a genetic background noise. Sometimes, trivial characteristics that have no influence on fitness one way or the other, can spread for lack of any selective pressure against them

Or a trait could spread as an adaptation: a physical or behavioural characteristic could be positively promoted by selection because of the reproductive advantage that it gives to an organism's offspring or other close kin that inherit it

Or it could be a by-product of an adaptation. A trait can spread not because it has fitness value in itself, but because it rides along as a side effect of some other trait that does have fitness value.

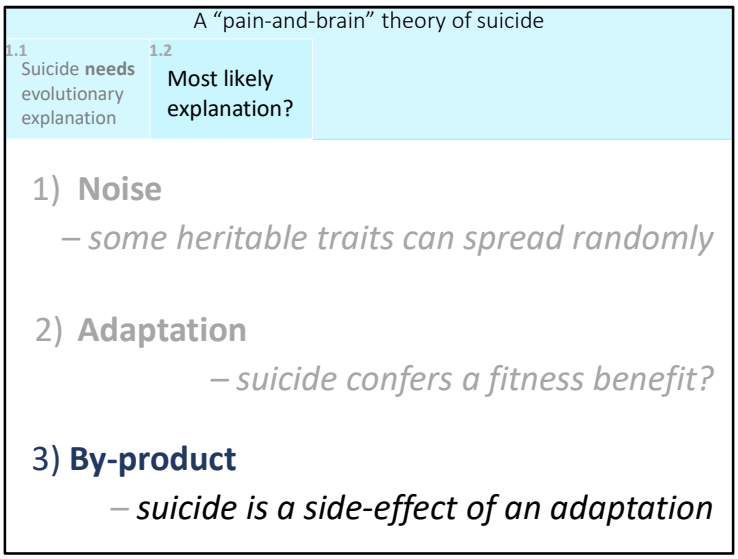
Which explanation is most likely? Which one leads the way? My book has a chapter devoted to this question, and I am going to have to skip over the details. But my assessment is that suicide almost certainly isn't noise because being dead is not trivial in fitness terms. As we have noted, being dead is predictably damaging to one's reproductive prospects. I reckon that suicide is unlikely to be an adaptation either, although some authors have put forward this kind of hypothesis, and it is the line of explanation that had tended to get most attention in the literature, at least until recently. The main reason I believe that suicide is probably not an adaption is that I am not persuaded that there are reliable fitness benefits directly to be had in killing oneself.

There are, possibly, evolutionary arguments based on group selection that could help to account for certain rare types of heroically self-endangering acts.

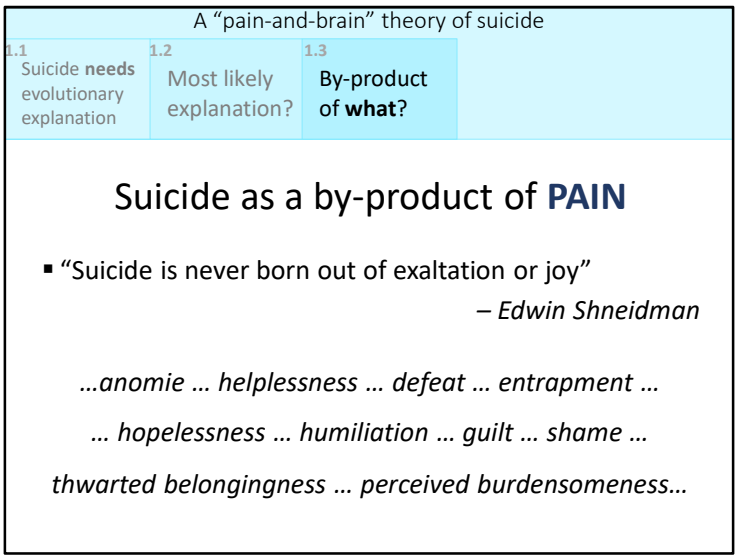
We can think, for example, of Captain Oates limping out into the blizzard, hoping his friends will have a better chance of making it to base camp if they don't have to carry him. But this scenario does not comfortably fit the bulk of "run-of-the-mill" solo suicides that we tend to come across.

Another argument, based on inclusive fitness, can explain sometimes self-sacrificing behaviours of sterile castes of hymenopteran insects when their colonies are under attack, because of these colonies' special genetic make-up. Worker ants don't breed and are close to being identical siblings, so there is little genetically to lose, and much potentially to gain, by sacrificing an individual soma for the benefit of the colony. The one at the top is what I heard called a "suicide bomber ant", because it explodes when attacked, spewing its toxic innards over its assailant and dying as a result.

But we are not worker ants. For virtually all mammals, humans included, there is unlikely to be an inclusive fitness upside in killing oneself that would come close to compensating for the catastrophic reproductive downside. Or rather, non-reproductive downside.



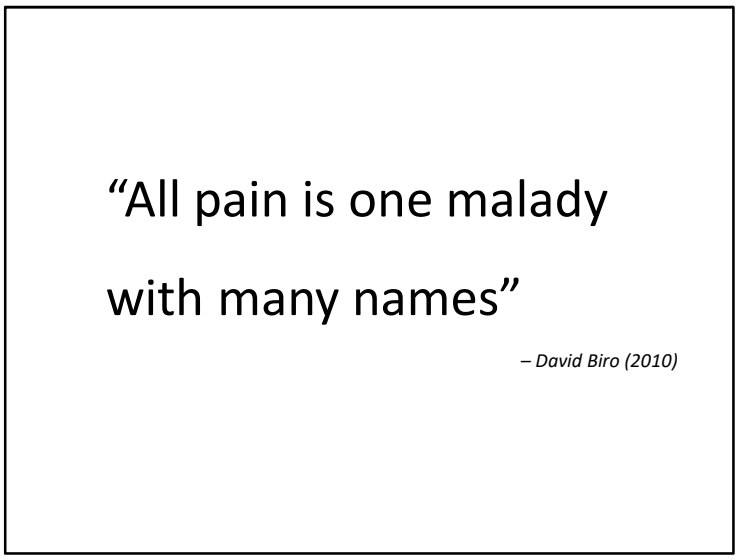
It seems to me, by elimination, that suicide is most likely the third of these options. It is probably an unfortunate, harmful, by-product of some other trait that is adaptive. Not everyone may agree with this assessment, but I take it to be the best available explanation.



But then, if suicide is a by-product, then the question raises itself: A by-product of what? What primary adaptation could be so advantageous that it is worth bearing secondary cost even of suicidality for its sake? To help us here, we can use a rule of thumb from evolutionary psychology, that if two traits associated with each other consistently across evolutionary history, then we will probably find that association still observable today. So we can look to the current epidemiology for signposts. We can ask, what powerfully adaptive traits are manifest in the epidemiological record that correlate strongly with suicide? I find there are two particularly striking candidates.

The first of these is pain. The psychologist Edwin Shneidman, said to be the father of suicidology, wrote something that may look like a statement of the obvious, but it is important. He writes "suicide is never born out of exaltation or joy". I would say this is one of the few points of unanimity among suicidologists. Suicide is strongly linked with pain, and in particular, emotional or psychological pain. Where researchers tend to disagree is not about pain as the cause, but about the cause of the pain. Different theories attribute suicide to different varieties of negative emotion, such as anomie, helplessness, defeat, entrapment, hopelessness, humiliation, guilt, shame, thwarted belongingness, perceived burdensomeness, and so on. I am not saying that these distressing feelings aren't valid or don't deserve empathic attention. I am suggesting that the parsing of colours of misery in this way may not be entirely helpful for the purpose of understanding suicide as a biological phenomenon, which is what we are trying to do.

Shneidman, E. S. (1998). Further reflections on suicide and psychache. *Suicide and Life-Threatening Behavior, 28*(3), 245-250.



David Biro, a dermatologist, makes the point by quoting an ancient Greek philosopher, and it is close to what the neurologists say too: "all pain is one malady with many names". There is a unitary dimension of painfulness in pain.

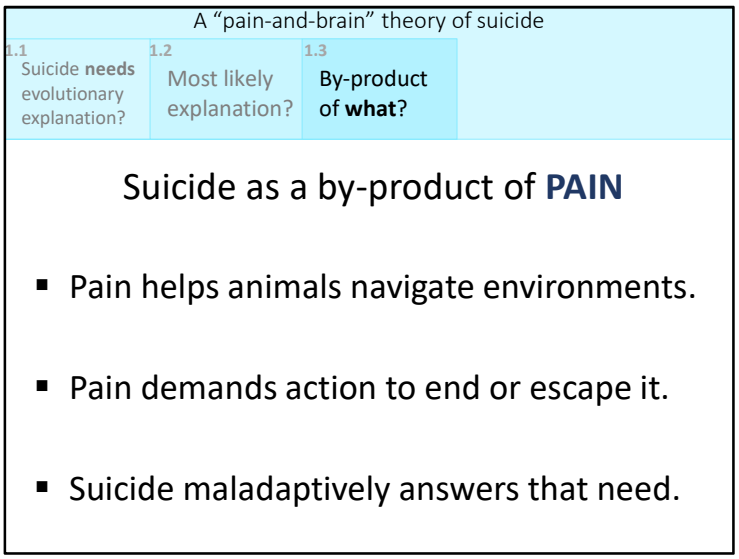
Biro, D. (2010). Is there such a thing as psychological pain? And why it matters. *Culture, Medicine, and Psychiatry, 34*(4), 658-667.

> "***Psychache*** refers to the hurt, anguish, soreness, aching, psychological pain in the psyche, the mind. It is intrinsically psychological – the pain of excessively felt shame, or guilt, or humiliation, or loneliness, or fear, or angst, or dread of growing old or of dying badly or whatever." – *Shneidman (1993, p. 51)*

Shneidman said much the same thing. He invented a word, Psychache, as a catch-all term for emotional pain, which is what he judged to be the common author of suicide.

You can see the all-embracing nature of the idea from this definition. Shneidman says "psychache refers to the hurt, anguish, soreness, aching, psychological pain in the psyche, the mind. It is intrinsically psychological – the pain of excessively felt shame, or guilt, or humiliation, or loneliness, or fear, or angst, or dread of growing old or of dying badly or whatever." I think in this way, Shneidman's psychache theory can be said to subsume many other theories of suicide that focus on varieties of emotional pain, and the urge to end it.

Shneidman, E. S. (1993). *Suicide as Psychache: A Clinical Aapproach to Self-Destructive Behavior*. Lanham, MD: Roman & Littlefield.



We can understand how suicide can come about, from an urge to escape pain. But let's go back to the question of suicide as a by-product of an adaptation.

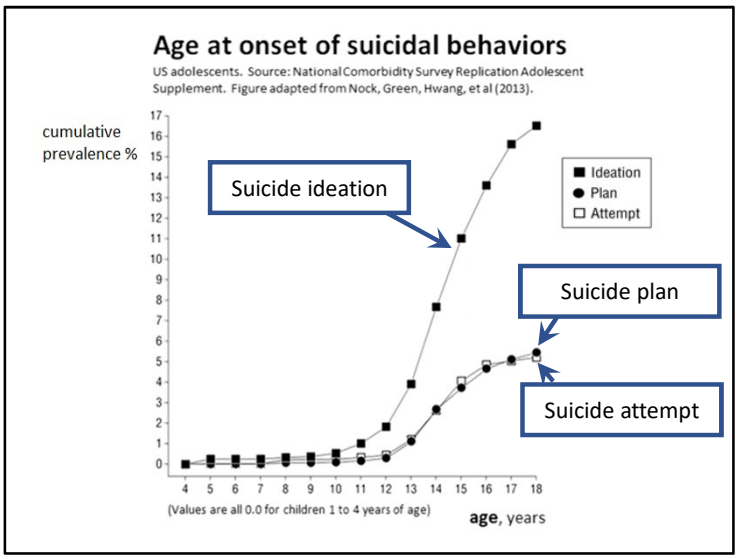
Is pain adaptive? By all accounts, yes.

Pain is what steers us away from fitness threats. Pain helps animals to navigate their environments. The environment may be internal as well as external, and, critically for us humans, our environment is social. What can be called "social pain" warns us of threats to our social supports and meaning systems, and by all accounts, it is at least as painful as physical pain and probably worse. I suggest that social or emotional pain features in accounts of suicide more often than physical pain simply because it tends to hurt more.

Pain works as an adaptive signal precisely because it hurts. Pain is biologically designed to be unbearable. It is designed specifically to motivate the organism to take action to end it or escape it.

In this light, deliberate self-killing can be seen as an effective way, a highly effective way, to satisfy what is a biological demand to end or escape pain. Suicide, in other words, appears to be a genetically maladaptive by-product of the primary adaptation of pain.

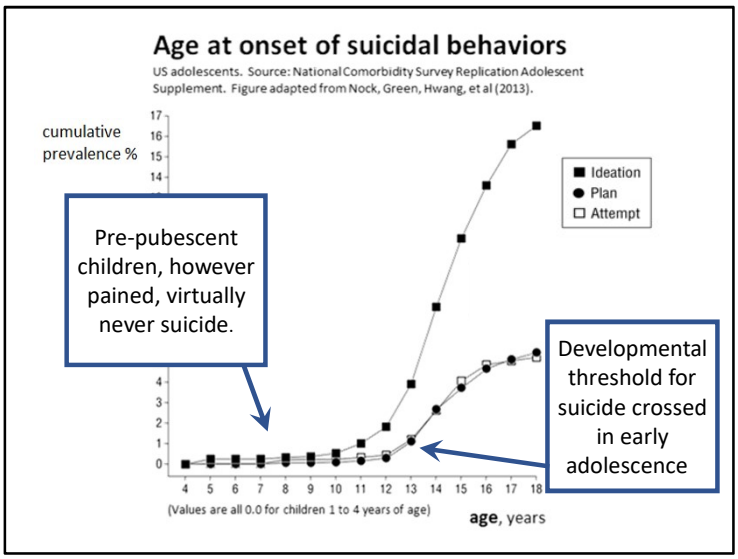
But this cannot be the whole story because, of course, virtually all humans experience pain, but few try to escape it by taking their own lives. Indeed there are two groups of humans who appear to be immune from suicide, however painful their lives are…



…and we can see one of these in this graph from a paper by Nock et al. It which shows the cumulative onset of suicidality in childhood by age for a sample of several thousand American adolescents. The x axis is age from 4 to 18 years. They don't show earlier than 4 because the curves are all at zero or close to zero, back to the origin. The top curve shows onset of suicidal thoughts or ideation. The y axis is the cumulative prevalence, running from zero up to 17%. So, looking at the tip of the top curve, we can say that by age 18, about 17% of American adolescents had thought seriously about taking their own lives, or that is what they told the researchers.

And there are two curves lower down, that track each other so closely that they may look like a single line. These show respectively the onsets of suicide plans and attempts. What we see here is that all three measures of suicidality remain flat, at or close to zero, throughout the early years of childhood. The curves lift off the ground at about age 12 or 13. Suicidal plans and attempts rise steeply at 13, flattening off again in the later teen years. The curve for suicide ideation, at the top, follows much the same shape, but a year or two earlier, and at a higher rate. This is probably a universal picture: similar statistical patterns are found in other countries, cultures, and historical times.

Nock, M. K., Green, J., Hwang, I., McLaughlin, K. A., Sampson, N. A., Zaslavsky, A. M., & Kessler, R. C. (2013). Prevalence, correlates, and treatment of lifetime suicidal behavior among adolescents: Results from the National Comorbidity Survey Replication Adolescent Supplement. *JAMA Psychiatry, 70*(3), 300-310.

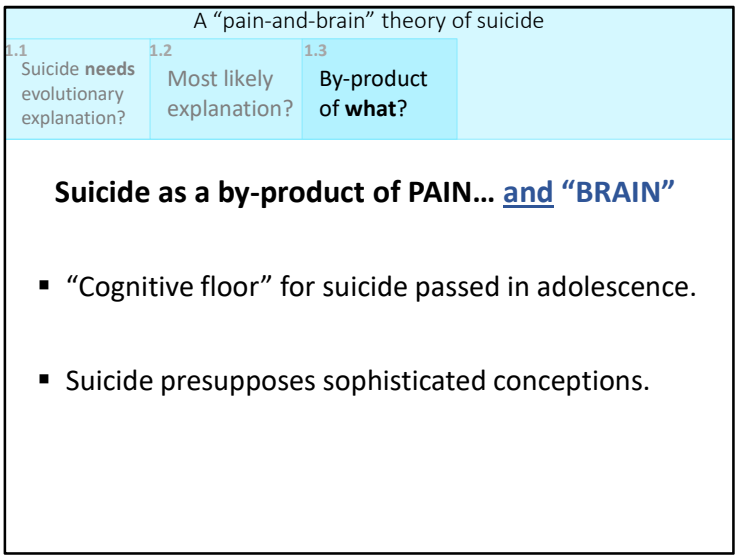


Age data like these demonstrate two relevant facts.

First, however painful young children experience their lives to be, they never, or virtually never (I have to say "virtually" because occasionally one hears of extraordinary cases), young children virtually never seriously consider, plan, or attempt to take their own lives.

Second, we have this discontinuity, an explosion of suicidality in the early teen years. Young people appear to cross some kind of developmental threshold.

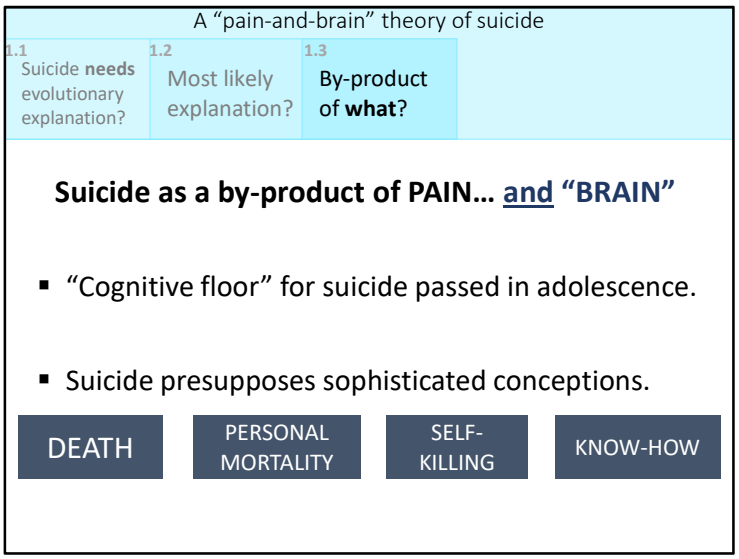
A few hypotheses have been put forward to explain this pattern, but the most plausible to me is that younger children are simply not equipped intellectually for suicide to be an option. It becomes conceivable at a certain stage in the development of the brain. And almost as soon as it is conceivable, as soon as the option becomes mentally available, the option starts to be exercised.



So my conclusion is that suicide is probably a by-product of not one but two adaptations combined. I call the 2nd adaptation "brain" for short, but what I mean is the intellectual sophistication of the typical post-pubertal human. I will put some more detail to this "brain" argument.

There appears to be "a cognitive floor for suicide". This phrase was coined by a writer, Sarah Perry, and she is referring to a minimum capability for abstract thinking, project planning, and technical competence needed to deliberately kill oneself. The cognitive floor is usually crossed in early adolescence, because suicide presupposes a number of sophisticated ideas that are literally inconceivable before that final stage of the development of the brain. We are talking, let us not forget, about deliberate self-killing. In order deliberately to do anything, you first need to have a mental representation of what it is you intend. And there appear to be several components of a mental representation of suicide, each of which can be viewed as a major intellectual feat.

Perry, S. A. (2014). *Every cradle is a grave: rethinking the ethics of birth and suicide*. Charleston, WV: Nine-Banded Books.

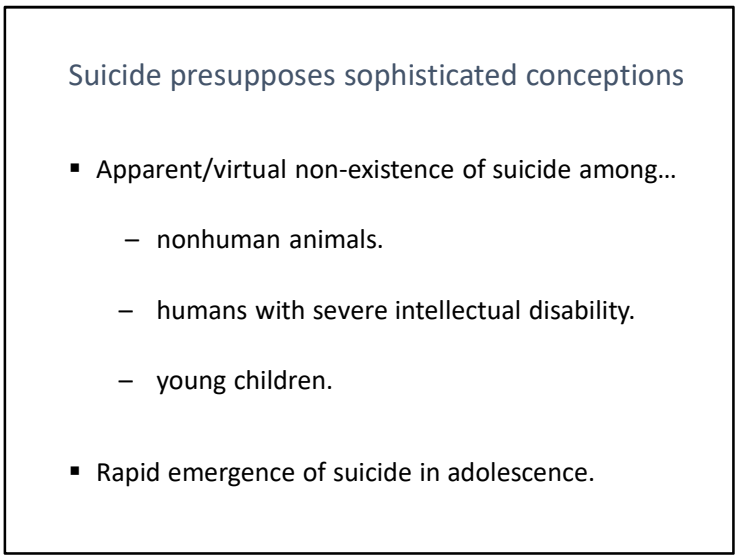


First, one needs to have a mature, generalisable understanding of death. As child psychologists have found, death is an abstraction built from other abstractions, such as permanence, finality, universality and so on. These elements develop at different times from the age about 4 onwards. It usually takes at least until the beginning of puberty for a mature understanding of death to take shape.

Then one must be able to extend the general idea of death to something that also applies to the self. This is the idea of personal mortality, the appalling realisation that none of us are getting out of here alive. The theologian Paul Tillich called this experience "the ontological shock", and some of us remember it well. It seems to come about as a result of several high level cognitive capabilities including class operations, and the application of logic which develops noticeably through the early teen years. It is probably for this reason that the notion of personal mortality usually dawns on children, or, rather, hits them, in adolescence.

And then, one needs to conceive not only of the mortality of the self, but that the self can induce the self's mortality. Indeed, the self needs to decide that it is in the self's interest that the self should induce the self's mortality. If you unpack the nested recursions in a thought like that, you may find, as I argue in my book, that there are at least 3, probably 4, and possibly even 5 levels of intentionality involved in a decision to suicide, or not to suicide for that matter. In other words, deliberate self-killing presupposes a degree of intentionality that goes beyond basic theory of mind and is probably beyond the computational processing capability of most children until they are into the teen years. And added to that is need for considerable technical and organisational know-how in order to plan and carry out a suicide project, all of which needs to be either learned or deduced.

Given all this, it is not surprising that young children virtually never suicide…



…and, interestingly, completed suicides are extremely rare, if they happen at all, among people with severe intellectual disability (1). We have already discussed the point that nonhuman animals too are apparently immune, and we can now imagine why that should be the case. An adult chimpanzee, said to be the most intelligent nonhuman, has theory of mind probably equivalent to that of a human one-and-a-half year old infant. There are outliers: I saw one experiment that could put an adult chimp on a par with a human 4- or 5-year old (2). But even a human five year old is several years away from developing the intellectual firepower necessary to conceive of deliberate self-killing, a capability that no chimpanzee is likely ever to get close to.

Let me recap this point, because it is important. We have these various observations: apparent non-existence of suicide among animals, absence of suicide among humans with moderate to severe and profound intellectual disabilities, absence of suicide among young children, and the rocketing of suicide in adolescence. Now we could put forward ad hoc explanations for each of these findings. But there is a single, simple, parsimonious, explanation available, and it is that suicide requires a certain minimum level of intellectual competence that is normally reached only by humans in adolescence. This is not my idea. Jean Baechler reached this conclusion in his analysis 50 years ago (3).

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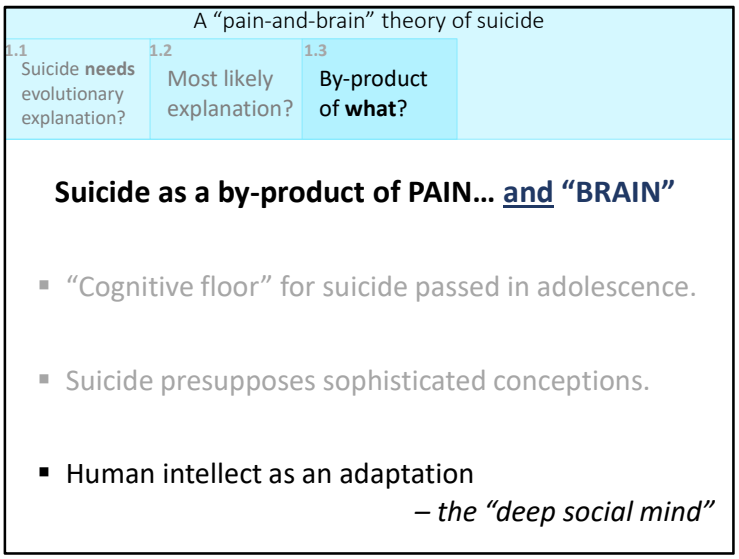
(1) Merrick, J., Merrick, E., Lunsky, Y., & Kandel, I. (2005). Suicide behavior in persons with intellectual disability. *The Scientific World Journal, 5*, 729-735.

(2) O Connell, S., & Dunbar, R. (2003). A test for comprehension of false belief in chimpanzees. *Evolution and cognition, 9*(2), 131-140.

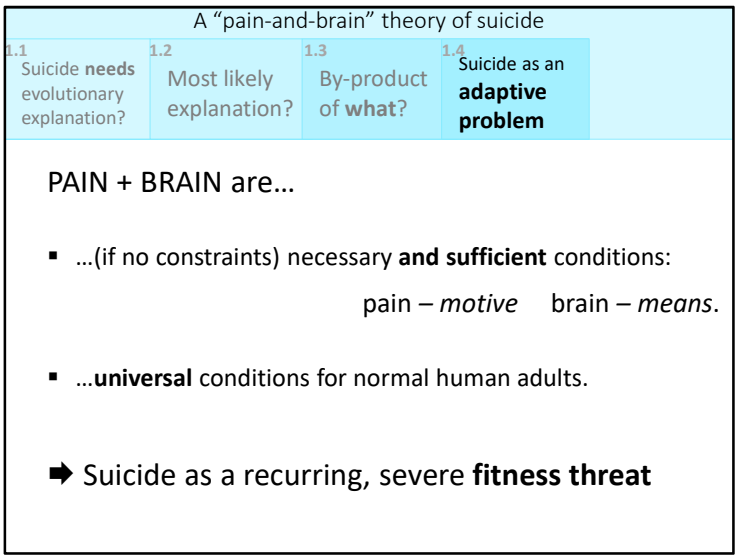
(3) Baechler, J. (1975/1979). *Les Suicides* (B. Cooper, Trans.). New York, NY: Basic Books.



But we are talking about suicide as a by-product of an adaptation. What is the adaptive value of this "brain" that produces such an unfortunate side effect? I think what we are discussing here is the very sapience of homo sapiens: in that sense, this "brain" is the defining adaptive feature of our species. By all accounts, it is the promiscuous flexibility of human cognition, and the computing power behind faculties such as mental time travel, theory of mind, language, teaching and so on, that probably account for our success as social animals. It is this cognitive adaptation, perhaps supremely, that has enabled us to set up home in diverse environments and to colonise much of the planet.

The psychologist Andrew Whiten coined the phrase "deep social mind" to highlight what may be a common factor for many adaptive aspects of human cognition: they are essentially social, they allow us to operate and co-operate in large and complex groups. The deep social mind is almost certainly adaptive, overall. But at a certain stage of development through the human life span, this adaption appears, incidentally, to open the door to the noxious by-product of deliberate self-killing.

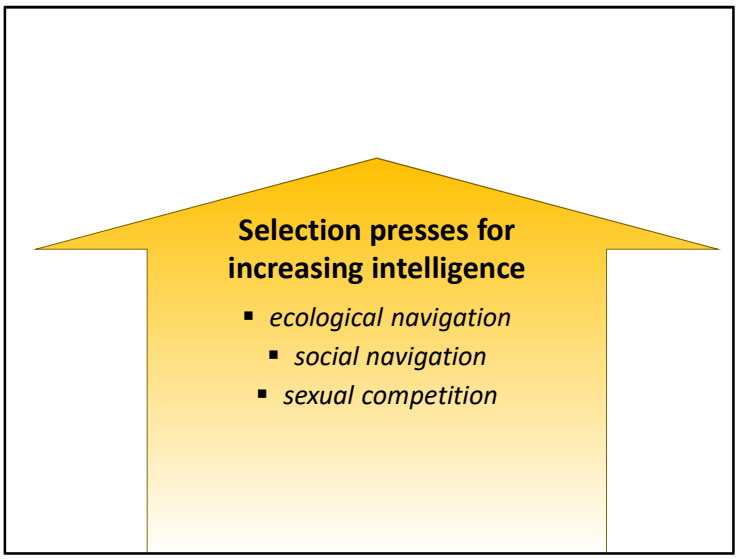
Whiten, A. (2007). The Place of 'Deep Social Mind' in the Evolution of Human Nature. In C. Pasternak (Ed.), *What makes us human?* (pp. 146-163). Oxford, UK: Oneworld.



We now have a problem, and it is an adaptive problem. We are accustomed to thinking about suicide as a moral problem, a public health problem, a clinical problem. But we need to think of it here as a biological problem. Because these two adaptations, "pain" and "brain" seem to me to be not only necessary conditions, but *sufficient*. The painfulness of pain, the demand it makes for the organism to act to escape it, provides the motive for escape. A brain capable escaping pain by switching itself off, provides the means. We need look no further for an ultimate explanation for the behaviour. In this slide I have included the proviso "if no constraints" – we will come back to this. The point for now is that, without constraints, any animal aware that it could escape pain and suffering by terminating its own consciousness would reasonably be expected to do so. It would seize the opportunity. No animal would put up with pain if it knew it didn't have to. Wilful self-killing is an expectable result of these twin "pain-and-brain" conditions.

We can also say that these conditions are probably *universal* among typical adult humans. Pain is universal among animals. Emotional pain probably comes with the territory of being a mammal. Social pain comes with the territory of being a social mammal. And the brain condition we discussed, the deep social mind: that is presumably universal among humans. We would all need to be equipped with roughly the same deep social mind in order for it to fulfil its deep social function.

So now suicide emerges not as a strange, deviant behaviour, but as a regular outcome of being human. We can infer that across our evolutionary history, suicide would have presented a recurring and serious fitness threat. I will show you some graphics that develop this point.



Here, selection is pressing in favour of increasing intelligence. This part of the story is not particularly contentious. There is broad agreement that brainpower would have been advanced in human evolution, perhaps for three reasons.

Intelligence probably enabled us to navigate, adjust to and dominate the ecological, physical environment.

But probably more important, as we have discussed, computing power makes possible the deep social mind, a mind that enables us to navigate large social groups.

And that fitness advantage was probably amplified by sexual selection, intelligent mates choosing each other, which sets up a runaway process – a rapid encephalisation.

As others have pointed out (1), this phase of human evolution would not have been difficult: if intelligence is good, and more intelligence is better, then selection would have driven simple quantitative increases in computing power.

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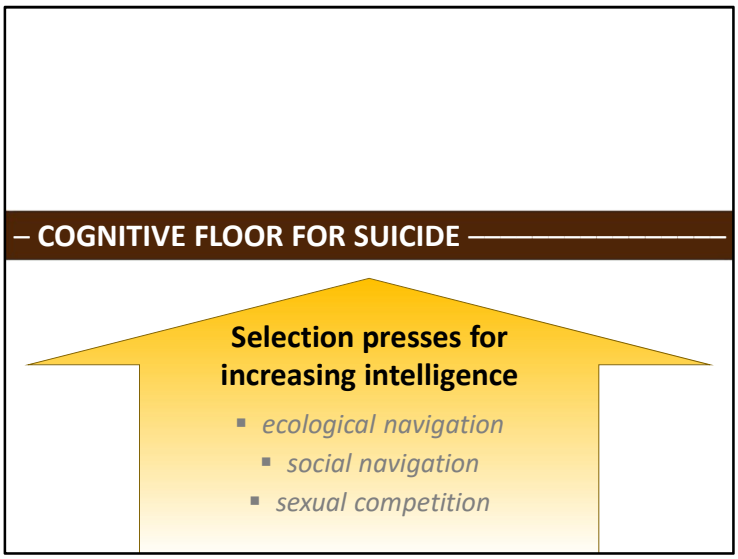
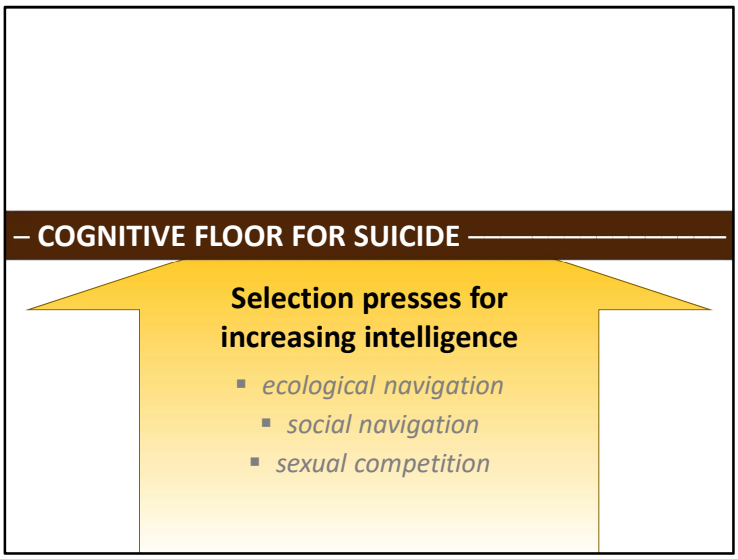
(1) Varki, A., & Brower, D. (2013). *Denial: Self-deception, false beliefs, and the origins of the human mind*. New York. NY: Twelve.

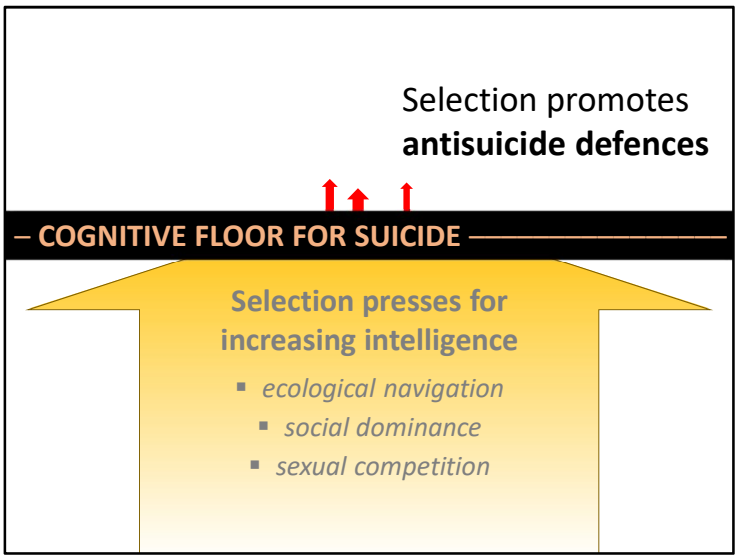


But then we need to consider the existence of the cognitive floor for suicide. What happens when this upward trajectory reaches the threshold that we saw crossed developmentally in that graph of suicidality in childhood?

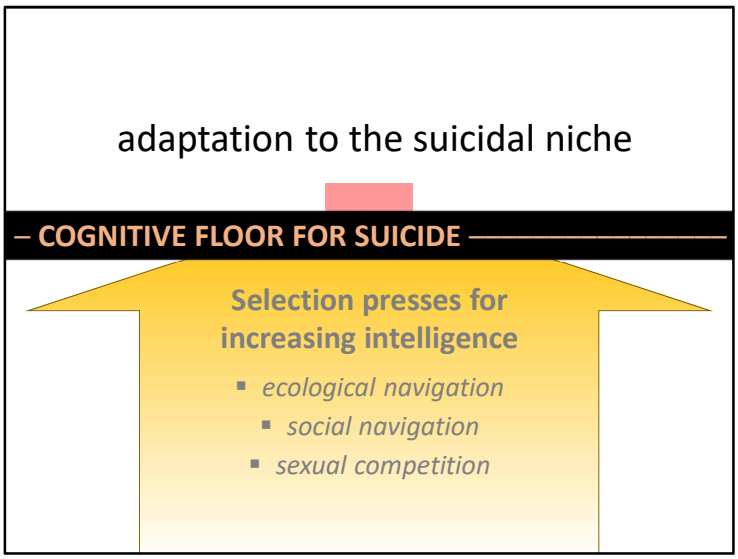


I suggest that, at this point, the evolution of human intelligence stalled, presumably at a level roughly comparable to that of a modern prepubescent child. The adaptive advantages of greater computing power have not gone away, so the upward pressure, favouring increased intelligence, remains in force. But at the same time, organisms surpassing the floor, "raising their heads above the parapet," so to speak, would be systematically culled. In other words, the cognitive floor for suicide would have acted as a ceiling, setting an upper limit on viable intelligence. I suggest that human intelligence was held at this point for many thousands of generations.

It is a kind of stand-off – an irresistible force meeting an immovable object. How is the confrontation resolved? Well, adaptive problems tend to seek out adaptive solutions.

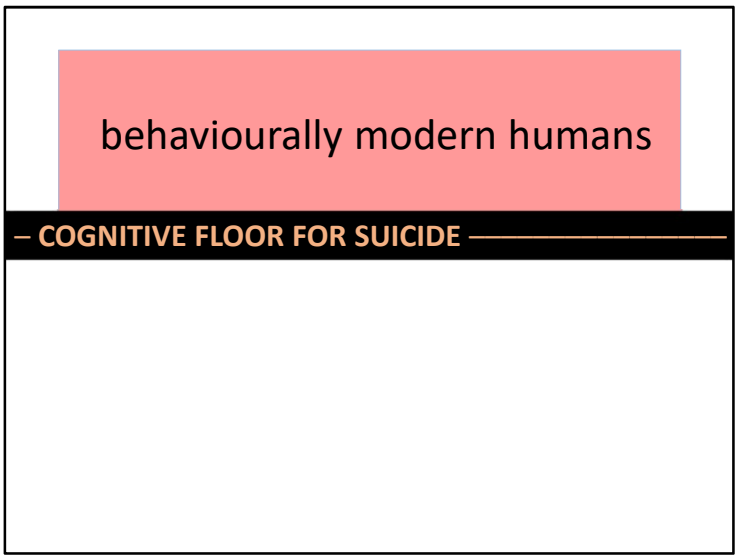


I suggest that human cognition began to evolve in a categorically different way. The offspring of mutant humans who had *both* intelligence above cognitive floor *and* some kind of heritable protection against suicide would be strongly favoured. The little red arrows on this graphic are meant to show embryonic antisuicide defences sprouting up from the floor, as if extruded under high pressure from below. These are novel, special purpose devices. They are specifically designed to prevent suicide developing over the lifespan. They are new because below the cognitive floor for suicide they would have served no adaptive purpose. But they are the key to winning the struggle for life now. There could have been any number of these defences, emerging, coalescing and fine-tuning themselves over the course of many millennia.



…until a stage is reached where the fitness problem of suicide is contained. It is not solved, because suicide is part of the landscape in this new environment, above the floor. Defences would evolve not to the point of zero suicidality, but only up to a compromise position, where the marginal fitness gain to be had in further reducing actuarial risk matches the marginal fitness cost of the defences needed to achieve that reduced risk. At a population level, I suggest a tipping point would have been a rate of suicide that was demographically sustainable.

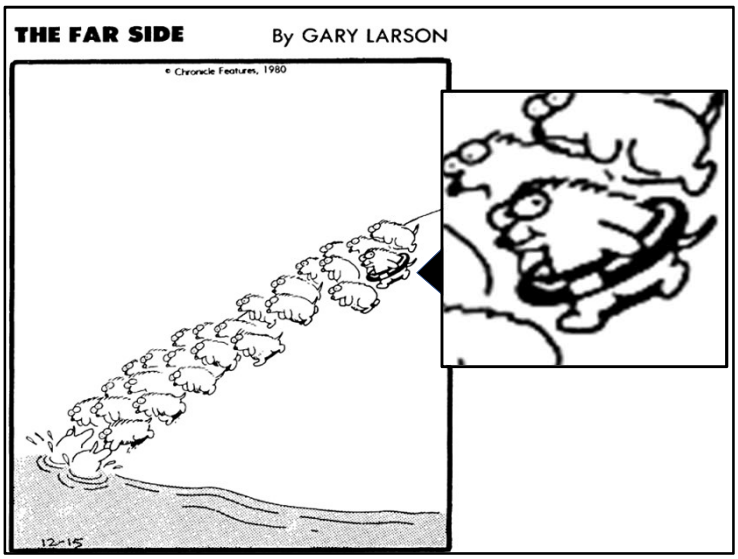
Now we have a super-intelligent variety of human, humans who are adapted to what we could call the suicidal niche. Those living below the cognitive floor may well have looked anatomically like modern humans, and by animal standards may not have been stupid, but this new group has an intellectual capability that would not have been seen before, would not have been survivable before.



Now the brakes off: for a rapid demographic expansion, and, powered by this new advanced cognitive machinery, for a flourishing of language and culture. I suggest the residents of this suicidal niche are the behaviourally modern humans who have prevailed, colonised the planet, and are us.

From this account, we should expect to find our species characterised by evolved defences, prophylactic devices that usually stop adolescent and adult humans from taking their own lives. The psychologist Nick Humphrey has also reached essentially this conclusion from his work, looking into the origins of human consciousness.

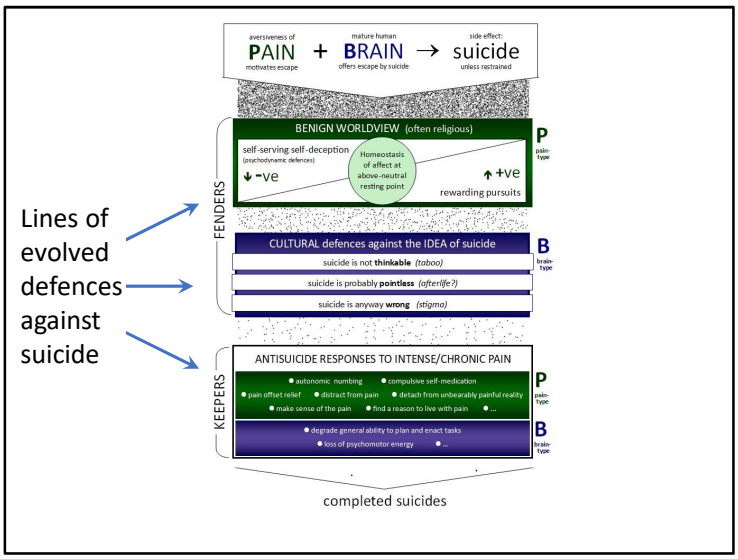
Humphrey, N. (2018). The lure of death: Suicide and human evolution. *Philosophical Transactions of the Royal Society, B, 373*, 20170269.



I can reprise the point with the help of a cartoon. It's a Gary Larson drawing in a book by the zoologist, Dennis Chitty, called "Do Lemmings Commit Suicide" – the answer is almost certainly no, and this drawing helps to explain why. We see here an imaginary stampede of hypothetical lemmings, hurtling toward a lake, apparently intent on drowning themselves.

But in the hoard is this mutant individual, looking at us with a knowing smile, and wearing a life ring. The point Chitty makes is that this individual's offspring are likely to feature disproportionately in future generations of lemmings. In a population prone to suicide, selection would be expected strongly to favour individuals with heritable protections that keep them alive and able to reproduce.

Chitty, D. (1996). *Do Lemmings Commit Suicide? Beautiful Hypotheses and Ugly Facts*. New York, NY: Oxford University Press.



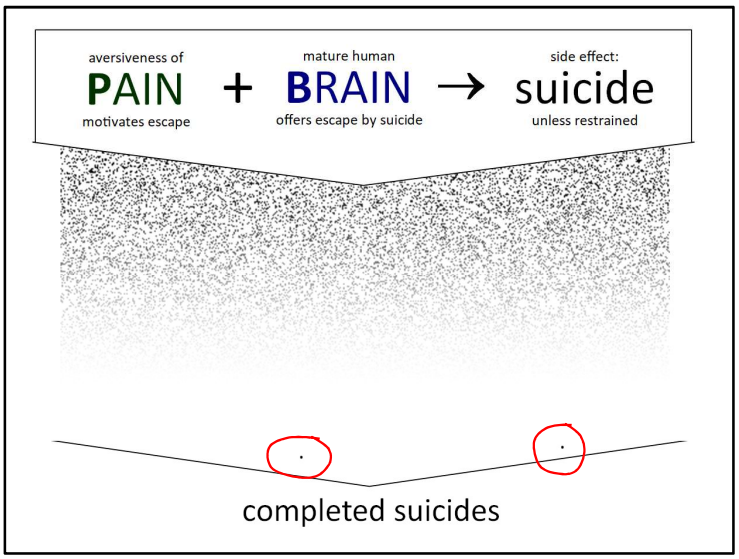
Hopefully by now I have convinced you that evolved protections against suicide probably exist. I think we can safely presume they do exist because if they didn't then we as a species, and we as individuals, would not be here.

So now we must ask, well ok, so what are they? What do these defences look like? I believe that they are many, varied, and interconnected. They form an integrated complex, and it is not easy to pick out bits that stand up in isolation for the purpose of a short talk, but I can show you this summary graphic that illustrates what I think is likely to be the general picture.

The graphic is taken from my book, and you can get the full story there. But briefly it shows my expectation as to how antisuicide defences probably work and relate to each other, based on what we can deduce about the adaptive problem, and about the kind of phylogenetic raw material that would have been available and could have been co-opted, to address the problem.

I think defences against deliberate self-killing probably form successive lines, arranged like cartridges in a filtration system, or serial fortifications on a battlefield. Their tasks will vary according to how close to the point of suicide we get. The further down the diagram we go, the more imminent the danger of death, and the more drastic the protective interventions would tend to get.

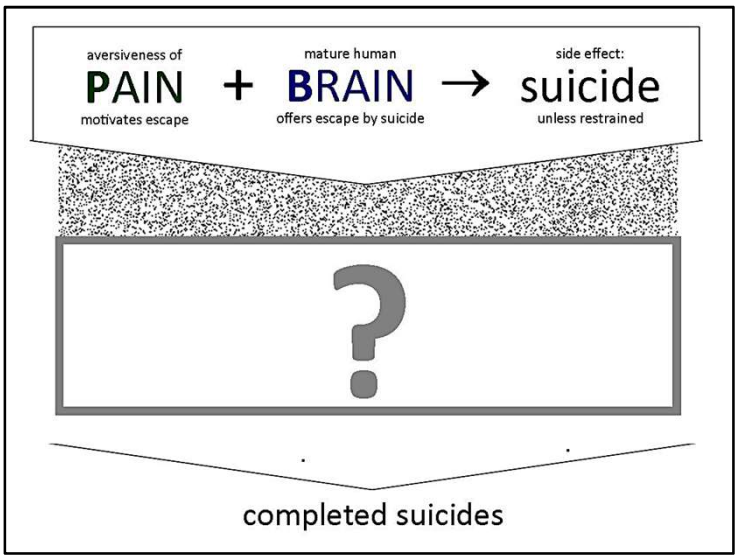
Soper, C. A. (2018). *The Evolution of Suicide*. Cham, Switzerland: Springer.



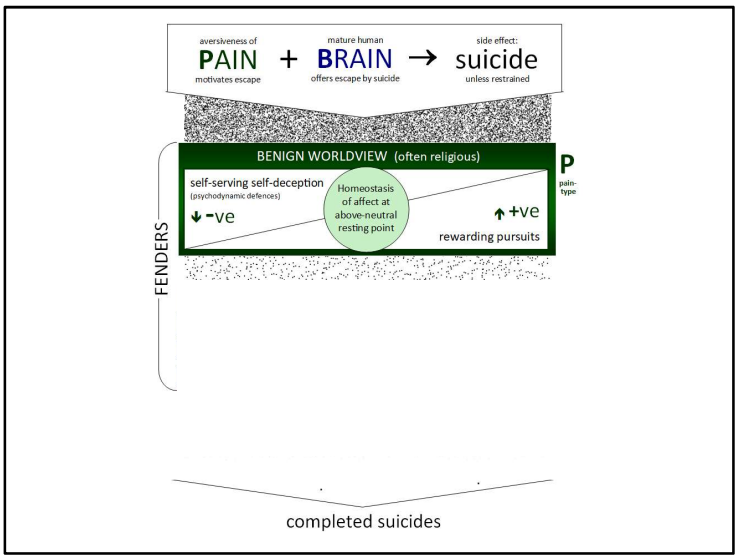
I will talk you through this diagram, starting at the top. We have discussed the basis of the theory, that two adaptations – the aversiveness of pain, which motivates escape, combined with the intellectual ability of the mature human brain, a brain that can conceive of oblivion as a way out of that pain – will predictably lead to suicide, unless some kind of restraints block that path.

Because these "pain" and "brain" features are universal, in the absence of restraints, we would expect to see self-killings as a routine human response to any kind of adversity, as the dense mass of dots towards the top is meant to show. But in actuality, of course, this is not what we see.

Very few of us do, in fact, take our own lives. We see rates of suicide across a hundred thousand population in the order of a dozen or so a year. I visually illustrate this with a couple of scattered dots in the sump at the bottom of the graphic, ringed here in red.



We can assume, therefore that restraints are in place somewhere in the middle that intervene, forestalling the vast majority of potential suicides that would otherwise happen. As I mentioned, I expect there to be multiple barriers

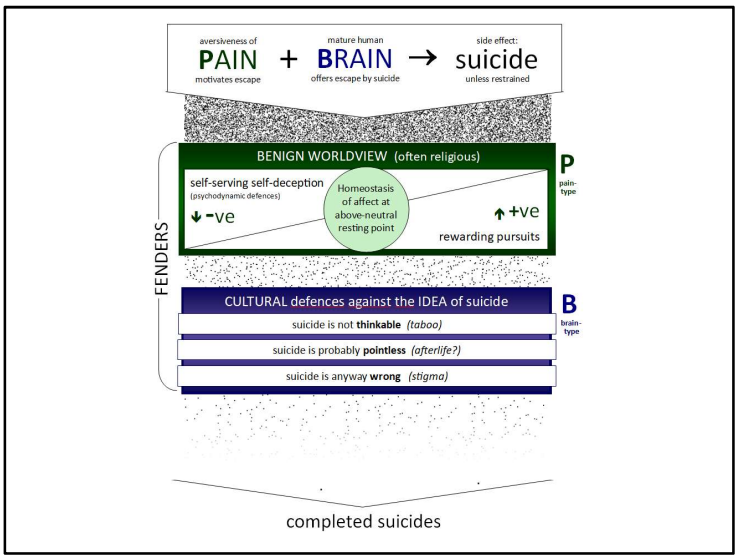


First I suggest we are equipped with a set of front-line active defences, I call them “pain type fenders” shown here as this green assembly. This is a cluster of psychological systems that operate continuously to keep our subjective experience of pain at a generally manageable level. They promote what we could call positive psychology.

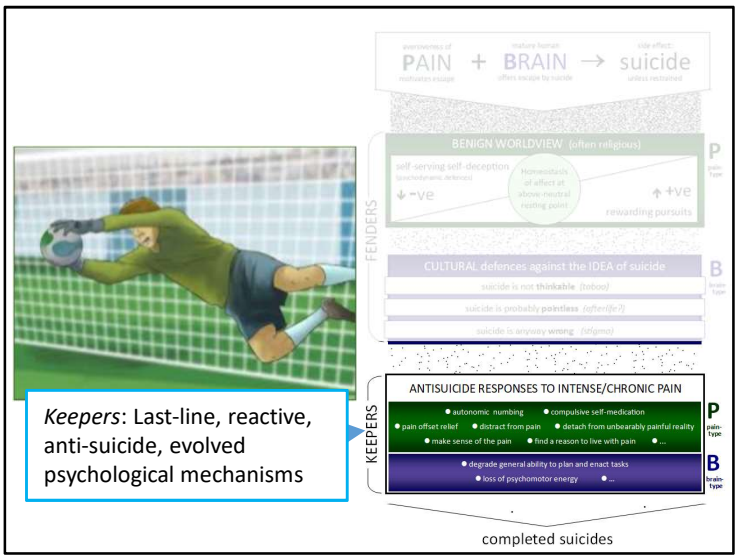
At the centre of this cluster is a homeostasis of affect around a resting point that is, importantly, above neutral. Most of us most of the time, are pretty happy, and at that position we are generally able to absorb and recover from painful shocks without great disruption. But to maintain our emotions artificially at this above-neutral resting state is hard work, rather like the way a bird has to defy gravity to stay in flight. To stay irrationally happy requires, I suggest, the continuous intervention of moderating systems which I show as two wedges either side of the circle. To the left is a variety of automatic mechanisms that control our conscious awareness of painful realities. They allow us self-servingly to deceive ourselves. Psychoanalysts might call these devices psychodynamic defences.

On the other side of the circle are mechanisms that manufacture positive affect. As a result of these, we humans spend much of our time and energy doing things that, in terms of reproductive fitness, seem frivolous. For any other animal they would be a maladaptive waste of resources, but for us these are the things that make life worth living.

The whole machinery is, I suggest, contained and regulated with the help of a superordinate system shown by the dark green box. This requires us to maintain and defend an irrationally benign view of ourselves in the world. We do not see the world as it is, we see it rather through the rose-tinted lens of this model, which is often spiritual or religious.

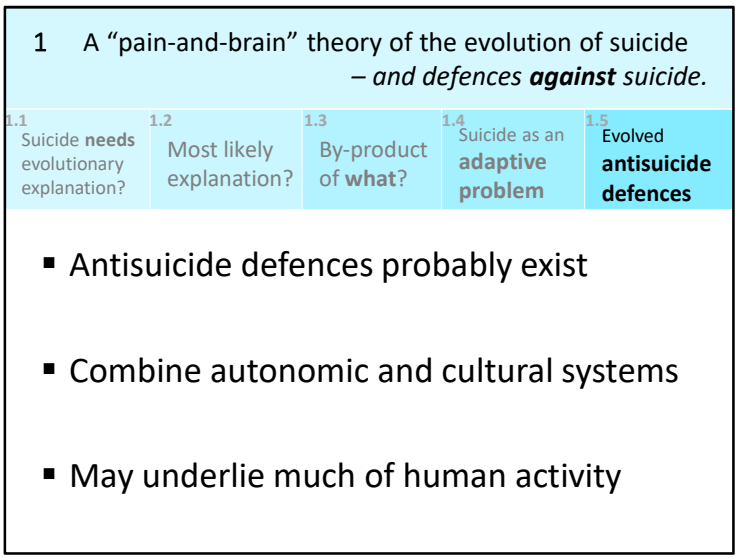


Next is are lines of cultural barriers against suicide, which I call "brain-type fenders", shown in this blue assembly. Their job is to keep the suicide idea safely unthinkable. One effect of these is that most people tend to find this is an unpleasant or difficult topic to think about, or talk about. I believe that the stigma against suicide, isolating and distressing though it is for the bereaved, probably serves a protective purpose at a community level. But it means that, unfortunately, close kin of suicides can experience exemplary social punishments.



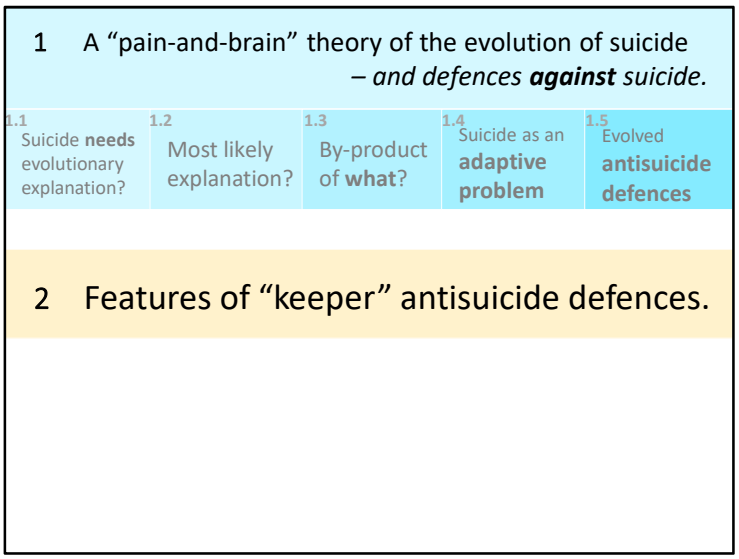
Finally, there is this panel at the bottom of the graphic, which is meant to show a battery of emergency measures, which I label "keepers".

Keepers are last-line, reactive, antisuicide evolved psychological mechanisms. I call them keepers to bring to mind the role of a goalkeeper on a soccer team or other team sports. The keeper is all that stands in the way of disaster. If the keeper fails, it's a conceded goal. And if the "sudden death" rule applies (I don't think it does in soccer, but let that pass) then a goal means it's game over. Most of the time the keeper is watching the game, in stand-by mode, ready to intervene. At times of crisis, on detecting an imminent attack, the keeper mobilises, perhaps risking a few bruises in the interests of saving the game – or, in the case of antisuicide responses, keeping us alive. The goalkeeper analogy breaks down unfortunately because I suspect there are many types of keepers, and they probably activate not one at a time but in combinations according to the individual's particular survival needs, but you'll get the general idea.

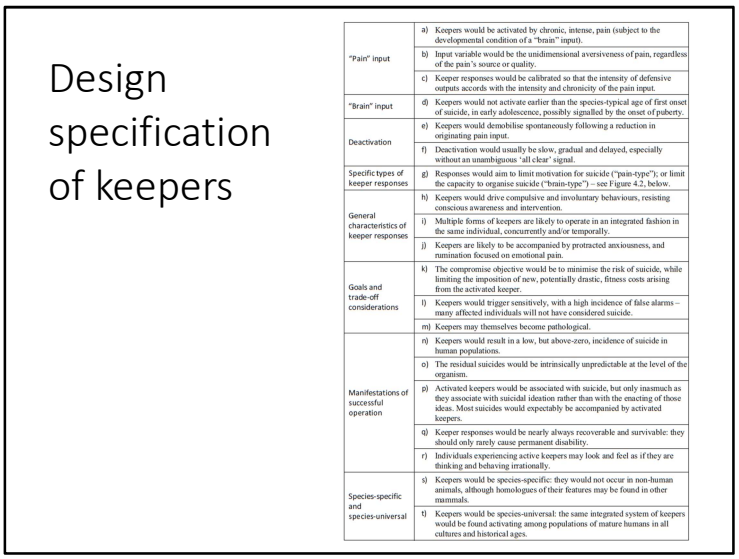


So, these are the kinds of ways in which I suggest humans have evolved to survive in the suicidal niche. Our defences are autonomic, in that sense instinctual, and involuntary. They will operate largely beyond our conscious control, or even our awareness. And some will also rely on cultural inputs for their proper functioning.

And I believe that these defences probably drive much of what we feel, think and do in our daily lives. Much of human behaviour is difficult to explain from an evolutionary perspective, until we realise that we humans, probably uniquely, are alive only because we choose to be. Now we have covered the pain-and-brain model.

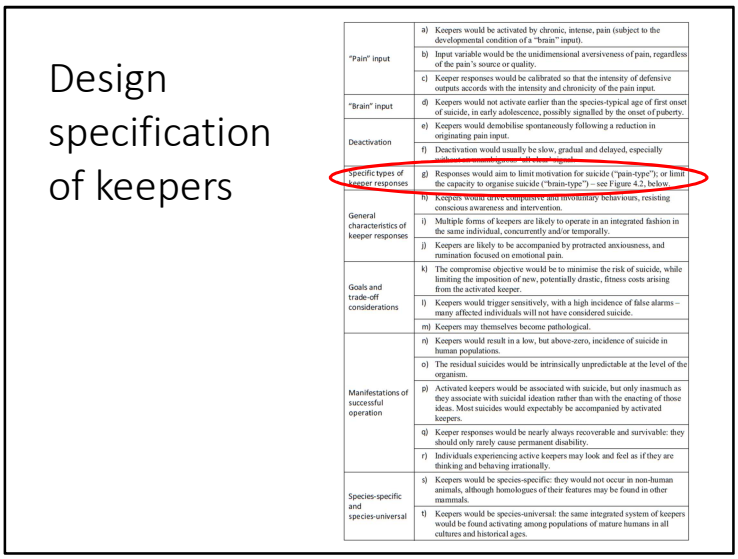


I would next like to spend a few minutes talking more about keepers, that last line of defences, which I think may be particularly relevant for the field of psychiatry. Keepers are discussed in two chapters in my book, and unfortunately their features form a tangle of detail which we don't have time here to review in depth.



But I can give you a taster, which is another summary graphic taken from my book. It itemises 20 predicted characteristics of keepers, from (a) to (t). These are features that we would reasonably expect to find, based on what it is possible to infer from the adaptive problem of suicide. This list is the outcome a task analysis, the kind of forward engineering exercise that evolutionary psychologists often do, trying to deduce likely design parameters of an evolved psychological mechanism based on the nature of the adaptive problem that the mechanism is meant to solve. Then we can compare that expected design to what we find in the real world, to see what we can learn. I am not expecting you to read all this chart, at least not now. I show it to you rather to give you a general feel for the kind of analysis that can come out of the evolutionary approach.

At the top, for example, are headings "Pain input", and below that "Brain input." These sections refer to the informational cues that a predicted system of keepers would be expected to use to activate itself. The question we are trying to answer is, How would a biological system detect an imminent threat of suicide? I am suggesting here that keepers would respond to two inputs, "pain" and "brain", which follow on from the pain-and-brain conditions that create suicide as an adaptive problem. The "pain" input would probably relate to the experiencing of chronic and intense emotional distress. The "brain" input is a matter of scheduling over the lifespan, probably linked with the developmental stage when suicide becomes intellectually possible. We can predict that keepers are unlikely to activate before early adolescence because they would provide no fitness benefit if they did. The next box down, Deactivation, tries to infer the kind of informational cue that would cause keepers to stand down. I am suggesting that keepers would demobilise, cautiously, once the precipitating emotional pain is relieved. In other words, keepers would operate as a psychological immune system, mobilising and demobilising spontaneously in response to the assessed threat.



Now the next box down is called "Specific types of keeper responses." I expect that there are two broad strategies, and only two strategies, by which keepers could forestall a suicide. They could either weaken the motivation, which I call "pain-type", or they could subvert the means, disrupting the brain's capacity to organise suicide, which I call "brain-type." I suggest most likely, both types of keeper would mobilise in combinations. Within these classes of intervention, there could be many tactical variations.

On the pain side, the organism could moderate the felt intensity or urgency of emotional pain, perhaps neurologically along the lines of the autonomic analgesia that moderates the experience of physical pain in trauma. On the brain side, there could be many ways in which keepers could downgrade cognitive faculties and psychomotor resources, enough to make an effective suicide mission practically impossible. The common thread is a measured attenuation of normal emotional and intellectual functioning. Presumably, this would give every impression that an individual who is in the protective grip of an activated keeper, has become, for the time being, mentally deranged.

Indeed, taking all these design parameters into account, from (a) to (t), it is hard to avoid noticing that activated keepers would be expected to look rather like phenomena we would normally take to be symptoms of common mental disorders. I am referring in particular to adult pattern depressions, alcoholism and other addictions, self-harming behaviours, psychotic delusions and possibly other psychopathologies.

Soper, C. A. (2018). *The Evolution of Suicide*. Cham, Switzerland: Springer.

- Hypothesised types of keeper responses can be mapped against diagnostic criteria

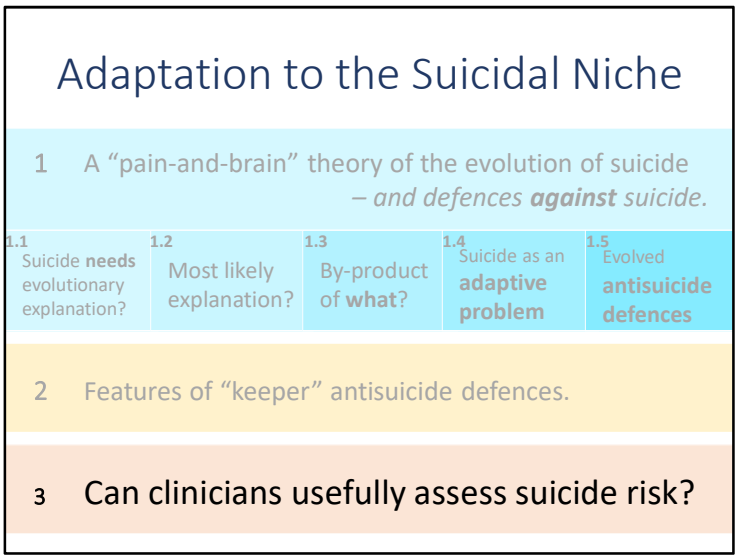
Suggested types of keeper anti-suicide mechanism (see Chapter 4)	**Diagnostic criteria of some common psychopathologies** (APA, 2013)						
	Major Depressive Disorder	**Substance use disorders**	**Generalised Anxiety Disorder** (GAD)[a]	**Non-suicidal self-injury** (NSSI)[b]	**Psychotic disorders**	**OCD**	**Bipolar disorders**
PAIN-TYPE (weaken the motivation for suicide) *(i) Autonomic numbing. (ii) Medicate the pain. (iii) Pain offset relief. (iv) Distract from pain. (v) Detach from pain. (vi) Make sense of the pain. (vii) Find reason to live with pain.*	• Feeling 'empty'; 'Having no feelings'; 'Not caring any more' *(i)* • Craving foods *(iv)*	• Compulsive use of analgesics and other mind-altering substances *(ii, iv, v, vi, vii)*	• Worry, rumination restlessness; insomnia *(vi, vii)*	• Self-injury *(iii, iv)*	• Diminished emotional expression *(i)* • Delusions; hallucinations *(iv, v, vi, vii)*	• Obsessions; compulsions *(iv, v, vii)*	• Depressive episode *(i)* • Manic/ hypomanic episodes *(iv, vii)*
BRAIN-TYPE (restrict access to the means of suicide) *(viii) Degrade ability to plan and enact tasks. (ix) Loss of psychomotor energy.*	• Indecisiveness; diminished ability to think or concentrate *(viii)* • Loss of interest in activities; fatigue, loss of energy, hypersomnia; psychomotor retardation; loss of appetite *(ix)*	• Compulsive use of sedatives *(viii, ix)*	• Difficulty concentrating; mind going blank *(viii)* • Fatigue *(ix)*		• Disorganised thinking; Disorganised/ abnormal motor behaviour *(viii)* • Negative symptoms; catatonia *(ix)*	• Obsessions (viii); • Compulsions *(ix)*	• Depressive episode *(viii, ix)*

Fig. 5.1 A tentative mapping of hypothesised types of anti-suicide mechanisms (keepers) across common diagnostic categories of mental disorder. (All but one of the mental disorders shown here could arguably manifest both of the posited twin strategies of keepers – to weaken the impetus towards a suicidal escape (pain type) and to impair the capacity to undertake a suicidal venture (brain type); [a]The anxiousness of generalised anxiety disorder may be better understood as a concomitant of keepers rather than a keeper defence in itself, but the pain-type function of GAD posited here might be taken to express the urgency of the organism's need to seek relief from suicidogenic pain; [b]Non-suicidal self-injury (NSSI), classified as a "condition for further study" in DSM-5 (APA, 2013), appears here as an exception, arguably lacking a "braintype" action: this function may be provided instead by other CMDs often comorbid with NSSI)

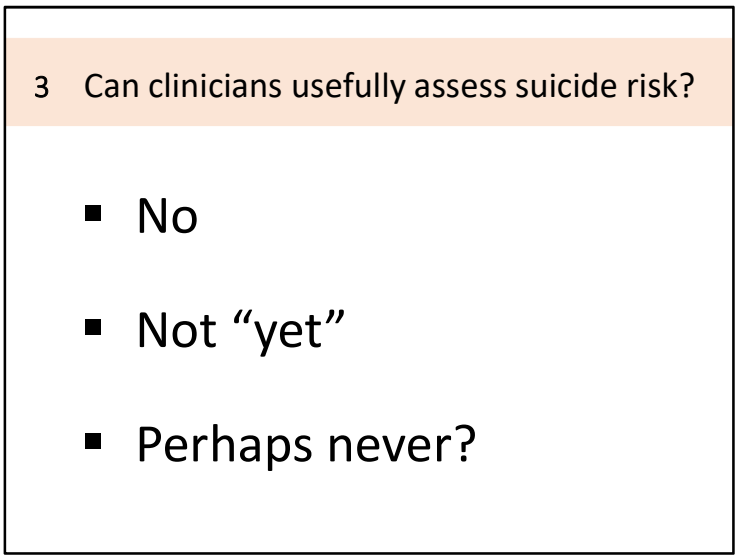
To show you what I mean, this chart, also in my book, and at the back of your handout, expands on that item (g) in the previous table. It lists down the first column some ways in which keeper mechanisms might reasonably be expected to block suicide, by softening the motivation and restricting the means. Along the row near the top, it lists some common mental disorders. The body of the table map keeper mechanisms against diagnostic criteria for those disorders.

So, for example, the emotional numbing and cognitive deficits of major depressive disorder would seem broadly to tally with ways in which keepers might be expected to make suicide unnecessary, or impracticable, or more likely both. This matching up is not neat, and it is tentative, but it looks to me at least plausible. My suggestion is that a diversity of psychiatric phenomena, conditions that may look different in their outer presentations, may actually be manifestations of a unitary antisuicide immune system, at work in adolescents and adults in response to chronic emotional pain.

Soper, C. A. (2018). *The Evolution of Suicide*. Cham, Switzerland: Springer.



To finish this talk, I wanted to look at this question "Can clinicians usefully assess suicide risk?" because it looms large in the work and responsibilities of psychiatry, and elsewhere in mental health. Is it possible to predict suicide on a case-by-case basis?

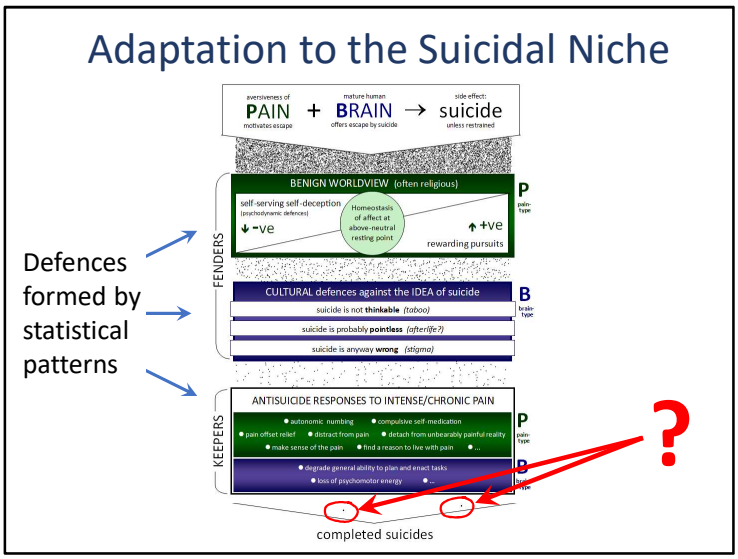


The overwhelming evidence is No. Not by clinical interview, questionnaires and assessment scales, or by “deep data” computerised algorithms, or any other known method. We can predict suicide no better than would happen by chance, which means that almost all of the time, the assessment will get it wrong. The great majority of people assessed as high risk will not take their own lives, and most suicides will happen among people are were not judged to be in imminent danger

This is the bald reality, but I am struck by the expectant gloss with which this reality is presented in the literature. The word that often appears is “yet” – it is not “yet” possible to predict suicide, the tools are not “yet” available, science has not “yet” found a solution, and so on. Behind the “yet” is a wishful assumption, a hopeful myth that persists with no evidential support, that suicide should be predictable – that prediction is a reasonable goal that ought to be within our grasp. The implication is that our total failure so far, a nil result from more than half a century of intensive research, is just a technical hitch that just needs more time and resources to correct.

But the "pain-and-brain" model suggests to me that suicide is probably not amenable to prediction in principle. I see no reason to expect that science will find a way to predict suicide on a case-by-case basis, at least not by any means I can currently conceive.

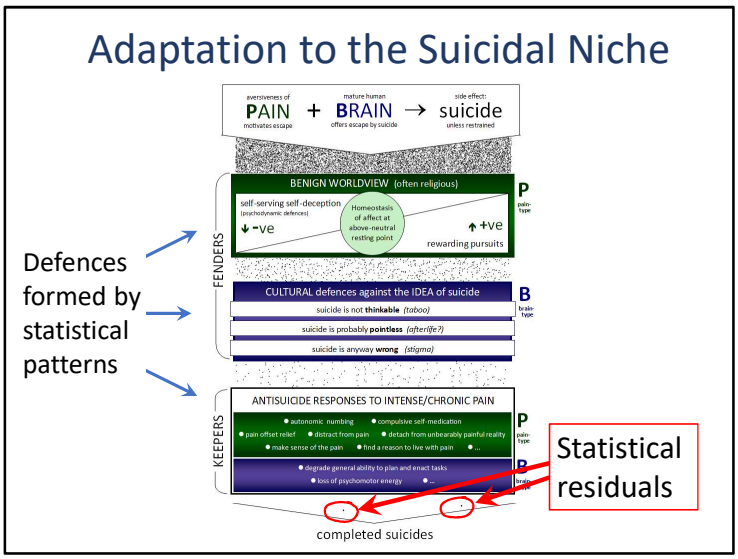
Let me explain why.



If the evolutionary analysis we have discussed is broadly correct, if we humans are adapted to survive in the suicidal niche, it is because of the evolution by selection of psychological mechanisms that are specifically designed to stop suicide. Perhaps something like this layered set-up that we looked at earlier.

Now these defences came about because of correlations between actuarial risk and informational cues, statistical patterns which selection detected and exploited over an evolutionary timescale. Selection fine-tuned mechanisms like these by a process of trial and success, capitalising upon whatever orderly, predictive data is available to the organism to detect and block suicides that would otherwise happen. This is how selection works: it responds to information in the environment (internal or external) that correlates with fitness threats and opportunities, and it tends to exhaust that information up to the edge of chaos.

So what can we say about those actual suicides, at the bottom of the graphic? Perhaps all we can say is that this is the residue. This is what is left after all the suicides that *could* have been stopped *have* been stopped. These are attacks that passed through all the defences undetected. I suggest they went undetected because they are intrinsically undetectable.



They are, in other words, statistical residuals. They contain no useful information to which organism could respond. If they had contained such information, they would not have happened. For us to come up with a way accurately, consistently, to predict these residual cases, we would need to find a marker that thousands of generations of selection has missed. It may not be impossible, but I suggest that to outperform the organism's own antisuicide equipment would be a formidable task. I will leave this slide here because it also reminds me that perhaps the cruellest thing we can do to people who have been bereaved by suicide to suggest that these residuals *are* in principle predictable: that loved ones should somehow have seen the tragedy coming, that there were actionable warning signs that were missed or ignored, and there was something they could have done to intervene. The reality is no, suicides cannot be predicted at the individual level, by anyone.

I have argued that as long as we are focussed on trying to find specific causes of suicide we will be chasing rainbows. Proximal causation in suicide is a mirage: it is a persistent and alluring mirage, but it always disappears when you try to get close. Setting aside wishful thinking, I know of no theoretical or empirical reason to believe that suicide predictably results from any particular drivers. I think there is plenty that can be done and perhaps should be done at a public health level, especially to restrict access to lethal means. But it seems to me that in clinical settings, the best we can do is to recognise that suicide is an ever-present danger for almost all of us. It is an occupational hazard of being human. But we can trust that, as products of selection, we are superbly designed to survive in this suicidal niche.

Soper, C. A. (2019). Beyond the search for suigiston: How evolution offers oxygen for suicidology. In V. Zeigler-Hill & T. K. Shackelford (Eds.), *Evolutionary Perspectives on Death*. New York, NY: Springer (In press).