Chapter 3

"It's not what you do, it's the way that you do it"

"Too Much Information"

In 1924, an unusually severe breach of the River Neva inundated Leningrad, including the cellar which housed Ivan Pavlov's laboratory and kennels. The flood was so severe that access to those areas was not possible for several days. On his eventual return, Pavlov noticed two striking phenomena. First, it became clear very quickly that most (if not all) of his dogs had "forgotten" the conditioning to which they had been exposed recently as part of the ongoing research programme. As the days and weeks passed, moreover, some of the dogs seemed to "bounce back" or be relatively unaffected – whereas others seemed "nervous" and still traumatised. From this second observation, Pavlov developed the notion of "Transmarginal Inhibition" or "TMI" (humorously "Too Much Information") to describe the tendency of the nervous system to "shut down" in response to overwhelming (traumatic) emotional or physical stimuli (i.e., "stress")[21]. The "Threshold of Transmarginal Inhibition" ("TTMI"), more specifically, refers to the variation between individuals in the point at which TMI occurs: given the same trauma, certain individuals "shut down" sooner than others.

Obsession with weakness

Pavlov seems to have had a predilection for descriptions of psychological pathologies and their putative physiological substrates (including schizophrenia and certain "cortical" cells) hinged on a dimension of "weakness". For Pavlov, "strength of the nervous system" was a fitting way of accounting for (canine) dispositional variations following the 1924 inundation. In a model of the nervous system which mediates learning[22], afferent stimuli – which have an "excitatory" effect – are modulated (or dampened) by some "inhibitory" process in order to avoid "overload". Whilst a general effect, its strength and inertia varies between individuals. Where excitation and inhibition are both "strong", TMI occurs late (i.e., there is high tolerance of stimulation before "overload" and the TTMI is high), and vigorous CRs are seen in classical conditioning. "Equilibration" is Pavlov's expression for the way in which excitation and inhibition are balanced (as a general phenomenon associated with stimulation but also as a trait-like tendency between individuals), and "mobility" describes the fluidity with which excitation-inhibition shifts occur.

An ancient taxonomy

Pavlov wasn't the first sharp observer to notice variations in animal character (now the sub-discipline of human psychology known as "personality" or "individual differences"). A taxonomy of four temperaments that originated in Ancient Greece and prevailed for some 2,000 years (until the Renaissance) has been adopted by a plethora of psychologists in the modern mould – as we shall see. Its survival into contemporary psychological culture is rather surprising given the system's simplicity, its superficial naïveté – and the extent to

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[21] TMI occurs across three stages: "equivalent" when responses are, for the most part, quantitatively proportional to stimuli; "paradoxical" involving a quantitative anomaly in which strong responses follow weak stimulation and *vice versa* – and "ultra-paradoxical" involving a qualitative anomaly in which "approach" behaviours towards "aversive" stimuli and "avoidance" behaviours in relation to rewarding ones are seen.

[22] As in the previous chapter, our explanations of conditioning are founded on conceptual models, not proven biological processes. These are framework theories waiting for corroboration or otherwise. The point is, we don't know how the brain works: we must be modest about the achievements of science in explaining human nature.

which we have become technologically sophisticated these days. But it is only in tracing the evolution and development of our present frameworks that we can come to appreciate what assumptions have been effected over time and, thereby, what preconceptions prevail today.

Love and strife

Our familiarity with the periodic table (of the elements) affords us a particular view of the physical world that renders almost impossibly difficult an authentic appreciation of the way sense was made of the world in pre-Socratic times (i.e., before 469 BC). In those days, according to Empedocles (490-430 BC), the "roots" of the material world were earth, water, air and fire. He accounted for the ways that materials behaved and morphed in terms of the unseen powers of "love" and "strife" (apparently attractive and divisive forces respectively). Plato was the first to use the term "elements" to refer to Empodocles' four material roots. In all of pre-Renaissance history, and arguably up until the present day – in, for example, "new-age" spirituality – a multitude of diverse global traditions has acknowledged a small number of material elements to which one or more "aethereal" ones have then been deemed ancillary[23]. The ancient four elements are readily identified as analogous to the *states* of matter recognised in modern science; i.e., solid, liquid, gas and plasma.

Greek sense of humour

In classical Greece, the ancient elements were associated with the four possible permutations of their two primary dimensions of "hot-cold" and "dry-wet" where: earth = dry and cold; water = cold and wet; air = wet and hot, and fire = hot and dry. Intuitively they were also identified with the seasons (autumn, winter, spring and summer respectively). This categorisation arrangement has come to be known as "humourism" (or "humouralism"), and is associated most commonly under this nomenclature with two seminal figures in the history of medicine – Hippocrates and Galen. Hippocrates of Kos (460-372 BC), aka the "father of medicine" (after whom the "Hippocratic Oath" is named) was a contemporary of Socrates. Bodily health in Hippocrates' understanding was contingent on the correct balance of four fluids (i.e., the humours) – each of which corresponded with an ancient element: black bile[24] (earth), phlegm (water), blood (air) and yellow bile[25] (fire). The humours wax and wane in the body according to diet, exercise, the seasons and so on. Medicine in those days amounted to corrective intervention: a compensatory diet, purging with laxatives, the application of leeches (in the case of "excess" blood), or other treatments intended to reverse the effect of the ascendant humour; e.g., cold and dry applications for mitigating a (hot and wet) fever.

Galen's medicine

Galen (129-200 AD) was a Roman physician known in his home country as Claudius (or Aelius) Galenus. More frequently he is known as Galen of Pergamum (or Pergamon, now Bergama in Turkey) where he discharged

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[23] **The word "quintessential" is based on the idea of a fifth, shall we say, *je ne sais quoi*. In Ancient Greece, the fifth element was "aether". In Hinduism it is "akasha". Whilst four of the seven (Hindi) chakras are fire, earth, water and air, the remaining three are non-material. The oriental concept of "void" traces its roots to Buddhism.**

[24] **Black bile, secreted by the kidneys and spleen (according to the ancients), was thought to be responsible for what came to be known as "melancholia" or "depression" (although the history of "melancholia" encompasses a broader range of psychological "disorders" – including what we now refer to as the range of "psychotic" illnesses).**

[25] **Yellow bile is a yellow-green liquid secreted by cells in the liver (hepatocytes). Stored in the gall bladder, or secreted directly into the duodenum, yellow bile aids digestion of lipids. The human liver can produce up to a litre of yellow bile per day.**

duties as physician to the gladiators. During his latter days back in Rome, Galen produced a large body of works – a significant proportion of which survived to steer the development of medicine not just in the West but in the world of Islam[26]. Always recognising and crediting Hippocrates, Galen was responsible for projecting "humourism" into nascent psychology as well as modern medicine. Following Hippocrates, Galen believed that temperament, like health, was attributable to humoural balance (*eucrasia*) or imbalance (*dyscrasia*): a preponderance of black bile engendered a "melancholic" (dejected) temperament; phlegm a "phlegmatic" (sluggish) temperament; blood a "sanguine" (spirited) one, and yellow bile a "choleric" (volatile) disposition.

Pavlov projects his weakness onto the ancients

What, then, of Pavlov's dogs, the cellar-ravaging Neva and TMI? Why not just two rather than four temperaments – "weak" (early onset of TMI) and "strong" (late TMI)? Rather curiously, given Ockham's Razor, Pavlov perpetuated the old system where: "choleric" corresponds with "strong excitatory" (suggesting an imbalance of excitation-inhibition with excitation predominating); "melancholic" matches "weak-inhibitory" (suggesting a corresponding weak inhibition imbalance); "phlegmatic" is "balanced" excitation-inhibition, and "sanguine" is excitation-inhibition in equilibrium with "lively" characteristics.

Intuitively satisfied?

When we consider the possibility of four discrete temperament types, are we intuitively satisfied that people can be partitioned in this way? Certainly we could have fun trying to categorise our nearest and dearest into these "square holes", but do they really fit? If not, what (if anything) could be "true" about them, and in what ways ought we to refine the basic propositions that they convey? Any significant appreciation of modern physiology would render almost ridiculously primitive Hippocratic explanations for illness; moreover, any kind of corresponding psychological typology jars with our intuition about the complexity of human personality. Many people find labels for people pejorative, even those generated in formal, medical diagnostic systems. Most folks don't like to be "pigeonholed" because, having been "prejudged", they feel less "understood" as a unique individual. Don't we, each of us, find other people intricate and unpredictable? The Hippocratic scheme, nevertheless, has been invoked, harnessed or modified by a multitude of figures who have shaped modern psychology – particularly the sub-discipline of "personality" or "individual differences". Amongst the most well-known and prolific of these was the self-styled *Rebel With A Cause* – Hans Jürgen Eysenck (1916-1997).

Eysenck follows Newton

Born in 1916 Berlin during the Great – or First World War, Eysenck's Thespian parents[27] separated when he was two. His mother re-married but, being Jewish like her new husband, Max Glass, was forced to flee to France during the political ascendancy of Hitler and the Nazis. Hans Eysenck was lodged (cf. Sir Isaac Newton) with his maternal grandmother, Frau Werner, who later died in a concentration camp. Eysenck himself refused to join the Hitler Youth, rejecting a place to study Physics at Berlin University. Eysenck sought exile in France and then England in 1934. Obtaining his doctorate at the University

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[26] Although many of Galen's works were lost or destroyed, a significant body eventually was adopted by Islamic physicians, and later translated back into Latin. Galen's investigations were confined to primates, dogs and pigs because of a trenchant taboo surrounding the dissection of human bodies – and his records featured significant errors as a consequence. This impediment to progress was dissolved during the Italian Renaissance when Andreas Vesalius (1514-1564) published new work with human cadavers.

[27] Eduard Anton Eysenck and Ruth Eysenck (née Werner) aka Helga Molander on stage

of London, Eysenck established Clinical Psychology in Britain after World War II at the Institute of Psychiatry in the Maudsley Hospital.

No fan of "unscientific" psychoanalysis

No fan of psychotherapy, particularly of the psychoanalytic kind (Eysenck was quite vociferous in rejecting any "unscientific"[28] concepts such as an unconscious mind or "Id"[29]), Eysenck was an ardent admirer of Galileo because of his stature as a scientist, and because he was persecuted for what he discovered and stood for. We can see in Eysenck, then, continuation of the empirical and scientific tradition to which we have alluded often – one that could clash unpleasantly with alternative approaches within the same discipline (i.e., modern psychology) less geared towards direct observation and measurement. Eysenck's approach to psychological treatment in clinical settings was heavily reliant on the principles of conditioning that we reviewed in Chapter 2. Established under the behaviorists' banner – the techniques, referred to as "behavioral", are commonly in use now.

"Toughness" is really "softness"

Eysenck earned a reputation as a controversial figure, not just as a landmark psychologist. His positions on, for example, the genetic contribution to intelligence and "genius" (including sex and race[30]) – and the actual nature of the relationship between smoking tobacco and cancer[31], were as often misinterpreted as they were appreciated. Eysenck was an industrious publisher of books and papers (so creating an unmistakeable career yardstick for the trenchant empiricist). Most of these were concerned with the measurement of IQ ("Intelligence Quotient") and individual differences by questionnaire. The idea behind the use of questionnaires is that huge amounts of behavioural data can be garnered very quickly with no significant sacrifice of accuracy (compared with costly and time-consuming interviews) – provided people are honest in the way they respond. Disadvantages include the possibility that respondents lack the self-awareness necessary to answer questionnaires "truthfully"; alternatively, may be too keen to register answers they think the researcher is looking for – or just afford ones that make them feel good about themselves.

No casual scrutiny

Whilst questionnaire testing may seem rather "convenient", the statistical procedures applied to the data so obtained are typically rigorous, meticulous and painstaking (arguably too much so given the inevitable vagaries and "error" in human self-report). In a complex correlational procedure known as "factor analysis", the relationships between individual questionnaire items are evaluated in such a way that patterns of behaviour not amenable to identification by more casual scrutiny can be detected. Questionnaire data pertaining to a multitude of human dispositions ("lower order") have been, as it

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[28] Ironically, Sigmund Freud (1856–1939) pitted the allegation "unscientific" against Carl Jung (1875–1961) for his breadth of appreciation of personality (see Chapter 8).

[29] It will be of great interest to any reader with a Freudian bent to know that, in the interview series "The Last Word" published in *The Guardian* newspaper on Saturday April 18th 1992 – when asked, "What is the trait you most deplore in yourself?" Hans Eysenck, the self-styled James Dean of psychology and "inventor" of the personality trait "Psychoticism" (equivalent to "tough- vs. tender-mindedness") answered, "Softness".

[30] Eysenck seemed satisfied to recognise that all geniuses are men (which is not to say that the average male and female scores on IQ tests are statistically different) and to engage in discussions about racial inequalities in performance on IQ tests – which have been highly modified since they were first produced – to eliminate cultural bias.

[31] The essence of Eysenck's position on the causal relationship between smoking and cancer is that it is non-existent or indirect; rather, a third factor – personality – is the causal agent for both (smoking and cancer, which only appear causally related).

were, cast into the statistical aether to see what ("higher order") dimensions draw these into some coherent picture. Theoretically, the most enduring have been the two primary traits of Extraversion ("E"), or outgoingness, and Neuroticism ("N") or emotional (in)stability. Most, if not all, "lower order" human tendencies fall under, and are statistically related to, one of these two overarching constructs.

Finding what you're looking for in science as in the spiritual life
Now, scientists are well known for despising "circular arguments". A circular argument is simply one that makes an assumption in its early stages of formation upon which a vital conclusion drawn later relies (very similar to the colloquialism "begging the question"): "When did you stop stealing from your employer?". The main problem with E and N is that they hinge on several circular (or quasi-circular) arguments:

1. As concepts, E and N are defined by what they measure. If someone were to ask the question "What is Extraversion?", the answer would be "Extraversion is what an Extraversion questionnaire measures".

2. "There are three kinds of lies: lies, damned lies and statistics" is attributed to Benjamin Disraeli (1804–1881), Prime Minister of the United Kingdom 1874–1880 and a friend of Queen Victoria (1819–1901) who reigned over the United Kingdom of Great Britain and Ireland from 1837 until her death (i.e., for over 63 years). The expression was made famous in North America by Samuel Langhorne Clemens (1835–1910) – otherwise known as Mark Twain – author of *The Adventures of Tom Sawyer* and *Adventures of Huckleberry Finn*. It is not so much that there is a deficit in the integrity of the statistics harnessed for the work on personality traits as that some of the mathematical processes involve a significant degree of subjective interpretation[32]. A researcher may focus on lower or higher order traits, and perhaps there are examples of both needles and haystacks in the literature.

3. The raw item material generated for the questionnaire study places limits on what can emerge during any data processing exercises that follow. At the very framing of a research question you are, to some extent, "begging the question". You can only answer the questions that you ask. If you are a dyed-in-the-wool empiricist wedded to the need for observation and measurement, you are going to look only for observable and measurable things. (Perhaps science is, after all, rather like the spiritual life – you find what you're looking for!)

Making do with "Stimulus Intensity Modulation"
To be fair to Eysenck and other personality trait advocates, you can only work with what is possible; i.e., it is not possible (for both practical and ethical reasons) to measure Extraversion across the surface of the brain with a "slipstick". The measurements can only be indirect. There is also significant mitigation that is afforded by invoking the principle of "validity"; i.e., the extent to which external evidence suggests that a personality questionnaire measures what it claims to measure. If a person obtained a high score on an Extraversion questionnaire, but was never to be seen at parties, you might question the validity of the questionnaire. The strongest case for a personality trait – in the eyes of the empiricist – is the biological one, and there is a substantial raft of research evidence suggesting that extraverts are "stimulus-hungry" (the reverse being true for introverts). For example, an extravert will produce less

[32] amongst which are the choice of technique for locating a reference factor in vector "hyperspace", the interpretation of Eigen Values (factor variance) or "scree plots" in deciding on an appropriate number of factors to extract from a correlation matrix – and the final method of rotation of factors for "best fit" (orthogonal versus oblique)

saliva than an introvert for a given quantity of stimulation (in the mouth with a fixed amount of lemon juice). Once into biology, the distraction of inheritance materialises, and the validity data for Extraversion (within the experimental category "stimulus intensity modulation") has been augmented with swathes of "twin" and "family" studies which – depending on how they are collapsed and allowing for biases in interpretation – suggest that the extent to which E is "inherited" (the "heritability coefficient") might be about a half.

A spanner (or two) in the works

The intrinsic nature of Extraversion has been modified since it was first established in questionnaire form. The Maudsley Personality Inventory (or MPI), published in 1959, was replaced by the Eysenck Personality Inventory (or EPI) in 1964. Both of these scales measure E, N and L, where L is a "Lie" scale included to detect false or improbable answers (of the "I never tell lies" kind). The MPI and EPI are, moreover, psychometrically equivalent – meaning that E and N in the two scales respectively measure the same thing (the questionnaire items aren't identical but they look pretty much similar in terms of what they are asking). The Eysenck Personality Questionnaire (or EPQ) published in 1975, however, threw a spanner in the works – well, actually – two spanners. The first spanner was the inclusion of a third "higher order" trait named "Psychoticism" or "P". If you look at the questionnaire items that make up this scale they have a lot to do with impulsivity – or acting hastily, and there's a mish-mash of other items to do with self-centredness – even cruelty[33]. The second spanner is that the E scale in the EPQ doesn't any longer look like E as it was presented in the MPI or EPI. It's changed from a mixture of sociability and impulsivity (in the EPI) to a more pure measure of sociability (in the EPQ) – the impulsivity items having migrated to P[34]. Similarly, whereas the N scale in the EPI measured both social sensitivity and hypochondriasis, the latter is missing from EPQ N[35].

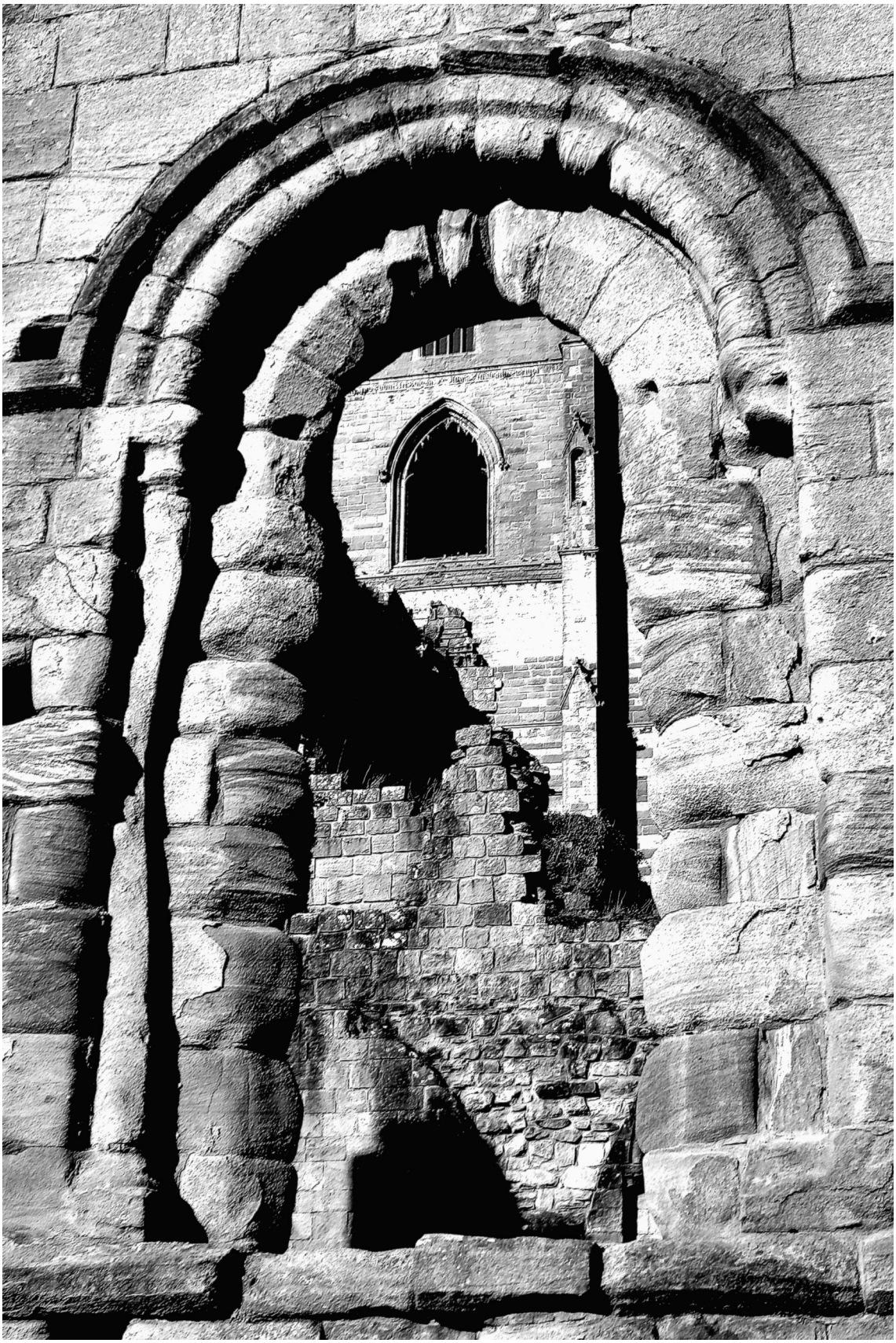
A few indicative items from Eysenck's E, N and P are shown below.

SAMPLE ITEMS FROM EYSENCK'S E, N AND P		
EPQ Extraversion (E)	**EPQ Neuroticism (N)**	**EPQ Psychoticism (P)**
Are you a very talkative person?	***Are you worried by awful things that might happen?***	***Would you take drugs that have strange effects on you?***
Would you enjoy a lively party?	***Do you suffer from 'nerves'?***	***Do you think insurance schemes are a waste of time?***
Do you like plenty of excitement going on around you?	***Are you often tired and listless for no good reason?***	***Did you tend to dislike your parents?***
Do you often do things on the spur of the moment?	***Would you describe yourself as 'moody'?***	***Do you sometimes tease animals?***

[33] Roger, D. and Morris, J. (1991) The internal structure of the EPQ scales. *Personality And Individual Differences, 12,* 759–764.

[34] Rocklin, T. and Revelle, W. (1981) The measurement of Extraversion. *British Journal Of Psychology, 20,* 279–284.

[35] Roger, D. and Nesshoever, W. (1987) The construction and preliminary validation of a scale for measuring emotion control. *Personality And Individual Differences, 8,* 527–534.



"Overarching Dimensions"
Fountains Abbey, North Yorkshire

A messy personality

Summarising questionnaire studies: (i) the individual items that belong to personality scales speak loudest about what the scale actually is – psychologically speaking; (ii) although there are strong mathematical relationships between items within each scale, the scales themselves are derived in subjective procedures; (iii) although the hardest evidence that traits exist comes from biological criteria ("stimulus intensity modulation" and heritability studies), it is still difficult to draw concrete conclusions because there is only a "weight of evidence", not incontrovertible corroboration, and (iv) it is apparent, even at first hand, that whether you examine the traits mathematically (with correlations) or behaviourally (looking at what the actual questionnaire items say), even the "higher order" dimensions appear "messy" (i.e., not entirely coherent internally).

Accounting for individual differences in "stimulus hunger"

Let's suppose that enough number crunching has been done in the past few decades in favour of E and N. Do they tell us much more about human nature than the ancient temperaments, or Pavlov's "excitation-inhibition"? Is it possible to wrap up all of these approaches (Ancient Greek, Pavlovian, Eysenckian) into one "stimulus hunger" framework? The extravert has a lower "resting" or baseline level of arousal than the introvert, this being determined at least in part by genetic factors. Because we all function best (psychologically) at some intermediate level of arousal; i.e., neither asleep nor super-vigilant, we engage in dispositional behaviour strategies (reflected in personality traits) to maintain this optimum. The extravert seeks stimulation so as to increase arousal from baseline to ideal, whereas the introvert avoids it for the same purpose. Traits are considered, like "hard" phenotypes such as height, to be "normally distributed" (compliant with the "bell-shaped curve") – most people falling around the average – with fewer and fewer located towards the extremes.

Eysenck on the same page as Pavlov

Just like Pavlov before him, Eysenck mapped E and N onto the four ancient temperaments with no apparent equivocation: the "melancholic" temperament corresponds with unstable introversion (E–N+), the "phlegmatic" is a stable introvert (E–N–), "sanguine" is equivalent to stable Extraversion (E+N–) and "choleric" is unstable Extraversion (E+N+). Eysenck's arousal model is strongly reminiscent of Pavlov's TMI, where Eysenck's extraverts correspond with Pavlov's "strong" (stimulus-tolerant) nervous system. Pavlov's TTMI could be regarded as analogous to the various points at which stimulus-control or emotionally avoidant behaviour "trips". Again we see the development of ideas as evolutionary, with successive theorists building on (at least recognising the relevance of) the models that have gone before.

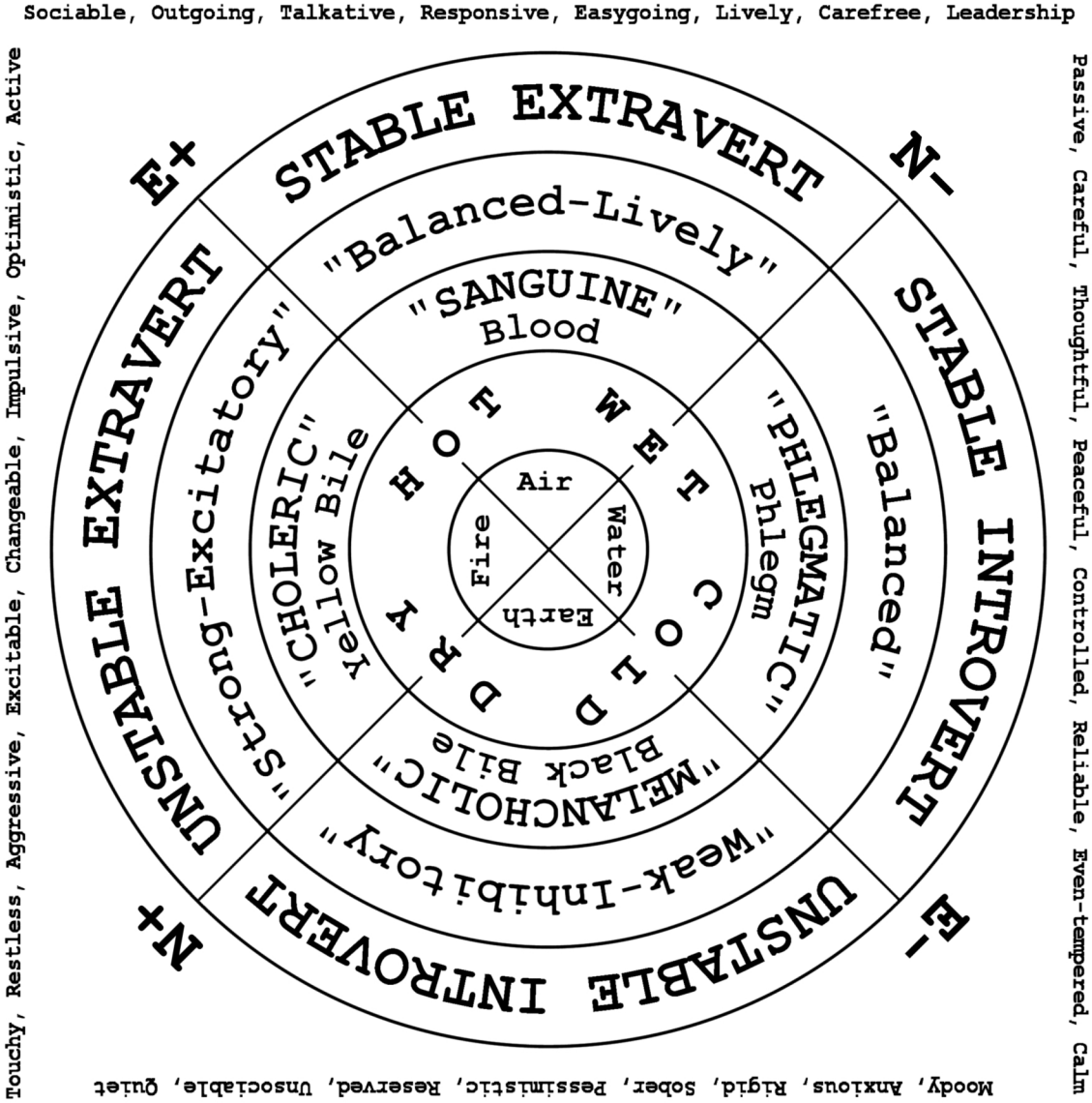
Even more risk of misunderstanding

There are many variations on these approaches to understanding individual differences across many walks of modern life. One of the most well known is the Myers-Briggs Type Indicator (or MBTI) from the 1940s, based on the work of the Swiss psychiatrist who established "analytical psychology" (as distinct from Freudian psychoanalysis) – Carl Gustav Jung (1875–1961). The MBTI is an instrument for measuring the four functions of the Jungian conscious psyche (sensation aka "sensing", "intuition", "thinking" and "feeling"). The MBTI outcome is allocation of a person to one of 16 types; however, we have already addressed the problem of partitioning humans into categories. The MBTI's psychometric properties have been challenged by academics; nevertheless, it is widely used in the business world where there is a huge risk of misinterpretation by non-specialists, and misplaced discrimination against employees based on spurious test results.

Woven threads

The threads of human personality we have teased out can be woven back into "concentric temperaments" as depicted in the following diagram.

"CONCENTRIC TEMPERAMENTS" DERIVED FROM THE ANCIENT ELEMENTS AND HUMOURS, PAVLOV'S EXCITATION-INHIBITION, AND EYSENCK'S E AND N (PERIMETER DESCRIPTIVES ARE FROM A SEMINAL EYSENCK PUBLICATION)



Time for confession

Surely it is quite extraordinary, given the scientific age in which we live, with its consistent calls for "evidence" and "proof", that such primitive models of personality are still considered pertinent to modern psychology and all its attendant activities – including psychotherapeutic treatment. Could we not – in a burst of collective frankness – confess how much we don't know, as assert how much we do (whether about how the human brain works, and what it does or doesn't generate, or what the universe is made of and "where it came from")? It seems we would rather defer to small but empirically-derived tangibles than contemplate, in a spirit of epistemological humility, how precious little we really are able to establish about our mutual differences, and immeasurably how much more we *might* have in common.

"Mindless Egghead"