Minds, Mechanisms and Made Free:

the scientific study of human life, as gratitude to the Creator

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Psychology: the science of an individual's life

NT Greek	*psuche*	*logos*
17th Century	soul a human person's <u>life</u>	word reason
19th	the individual's social, biological & mental activities	a body of <u>knowledge</u> / a Science

21st Century (jargon)   'biosocial cognitive science'

N.B. US Psyc.s' rediscovery of mind as "Cognitive Psychology" includes Cognition, Affect & Conation

the Bible's view of human life / the soul:

D.A. Booth (1998). Human nature: unitary or fragmented? - biblical language and scientific understanding. *Science & Christian Belief* 10, 145-162.

J.B. Green (1999) *S&CB* 11, 51-63.   D.A. Booth (2000) *S&CB* 12, 65-66.

What nowadays I can call 'biosocial cognition' (basic and applied)

It's almost exactly 50 years since the Lord called me to engage with two sorts of scholarly understanding of the human mind -
experimental psychology and linguistic philosophy.
[PPP student showed me Psychology and Philosophy (the UK academic disciplines) during my first fortnight as an undergraduate in Chemistry.]

The **biosocial** nature of **mind** was brought to full scientific light by both these disciplines at Cambridge University in the 1930s:

- Sir Frederick Bartlett, head of the first university department of Psychology in England, is famous for demonstrating how **rumours** evolve - accounts change when passed as memories;

- the later Wittgenstein wrestled with how language works, and showed that its **meaning** is public within societies of embodied tacklers of joint tasks - or 'language games' as he called them.

Yet socio-psycho-somatic unity of human life just begun to break - reductionism of neuropsychology & now of social neuroscience; - anti-biological postmodernist "qualitative" social psychology.

Psychology
scientific study of the mechanisms of actions

objective <u>achievements</u> by the whole organism/system
(human being or other species, from ape to bacterium)
((maybe one day - ?next century - a socially educated intelligent robot))
- intentions/actions, percepts/sensations, thoughts/solutions,
emotions/cooperations, communications etc.

what <u>task</u> the individual successfully <u>performed</u>,
and <u>by</u> what <u>mental</u>/behavioural <u>causation</u>
("Mind" or "Behavio[u]r" - no real difference)
- *not* subjective contents of a private world
- *not* neural causation or brain activity
- *not* societal causation or cultural functions
- *not* bodily movements or physical dynamics
- *not* environmental or/and genetic origins

Psychology
scientific study of mechanisms of action

Input patterns ('stimuli') from the environment
Output patterns ('responses') to the environment
    both are educatedly observable **patterns**
                    that are publicly re-identifiable in a culture;
    neither is completely determinate *physical*ly:
a 'stimulus' is *not* mere stimulation - an affordance perceived
a 'response' is *not* mere movement - it is an action intended

This i/o dynamic provides <u>evidence</u>
    for some hypotheses and against others
        about the **<u>mental</u>** activity in <u>transforming</u>
            stimulus patterns into response patterns.

Performance of a social or physical 'task' is
- successful **transformation** of input into output
- causal **influence** of input on throughput to output
- **sensitivity** of output to input and throughput
These are mathematically <u>equivalent</u>
measurements of the processing of
information by an adapted system.

Like any other science,
psychology extracts evidence about
<u>theor</u>etically specified processes/states/entities
from <u>observ</u>ations of the systems being studied.

next

a demonstration of task-performance
that needs psychological theory to explain it

Instructions

I'll show you a series of words, one at a time.

Please try to remember each of the words.

As soon as the list is finished,

I'll ask you to **<u>write</u>** down

all the words that you can recall

in any order that they come to mind.

Blank piece of paper? Writing instrument?   - but DON'T write until I say so!

Ready?

WATCH **HERE**

YACHT

FLAME

SHEEP

HOUSE

SHIRT

TRAIN

BREAD

CRATE

BRASS

WAIST

MOUTH
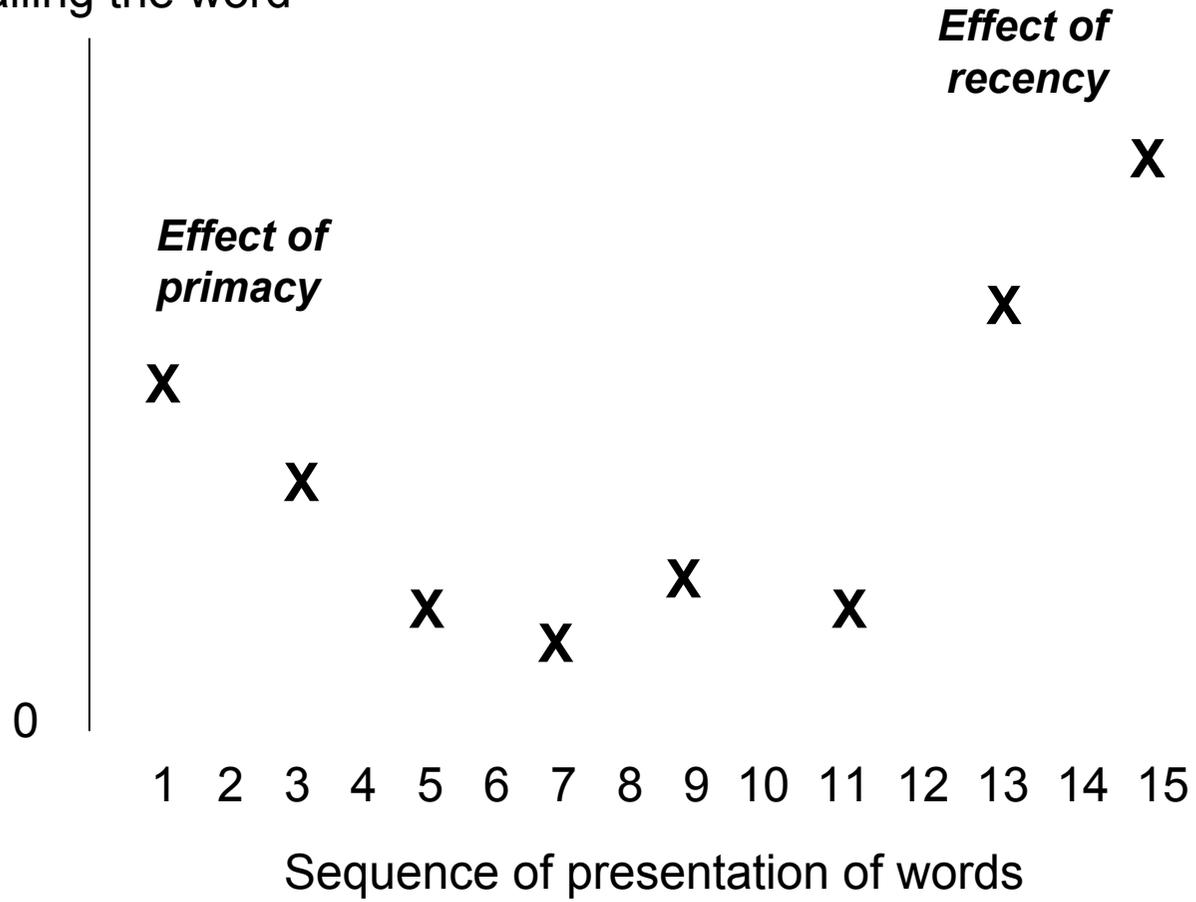
LEASH

CHAIR

QUEEN

PEACH

Now start writing as many words

as you can remember from the list,

in any order that they come to mind.

Stop writing!

When I show a word,

please put up your hand

if it is written on your list

Typical findings (grouped data)

Percent correctly
recalling the word

**Effect of
recency**

**Effect of
primacy**

| | | | | | | | | | | | | | | |
|1|2|3|4|5|6|7|8|9|10|11|12|13|14|15|

Sequence of presentation of words

0

Interpretation (testing theory on evidence)

Recency

As you start writing, you are still 'rehearsing' (holding in a 'buffer')
  the most recent word(s) - consciously <u>or</u> unconsciously -
   and so you don't have to retrieve from 'permanent store.'
    Supportive evidence: if the first words you wrote
    (and got right) were the last words presented.

Is the 'Recency Effect' a result of decay of memory with time?
  <u>No</u>: if you present each word for longer, <u>more</u> of those towards
    the end of the list are recalled. Temporary 'buffer' is a loop.

How many items can this buffer-loop hold at most?
  Simplest to interpret if Primacy & Recency effects have about
    same no. of items in them, e.g. 3, maybe 4, 5 or even 6 or 7.
  A difference in number between Primacy and Recency effects
    requires complicating the basic theory of one rehearsal loop.

Interpretation (testing theory on evidence)

Primacy: "rehearsal" sustains a short series of temporary mental records that leave a additional permanent record <u>each time</u> a record is replayed - i.e. self-present the <u>first</u> word <u>several</u> times.

Is this 're-play' limited by the number of items or by duration?
Test by varying the time between stimuli: such results show that it's the number (a loop of items), not the duration of replaying.

'Re-hear' the word's sound? Re-say the word silently? Re-see the spelling or a scene brought to mind by the word when presented? Use a mnemonic? - e.g. put the words around a familiar room.
Test by rigging the list to be confusable in sounds, in the articulatory movements, the spellings, the usual imagery: evidence for 'visual scratchpad' and 'articulatory loop'.
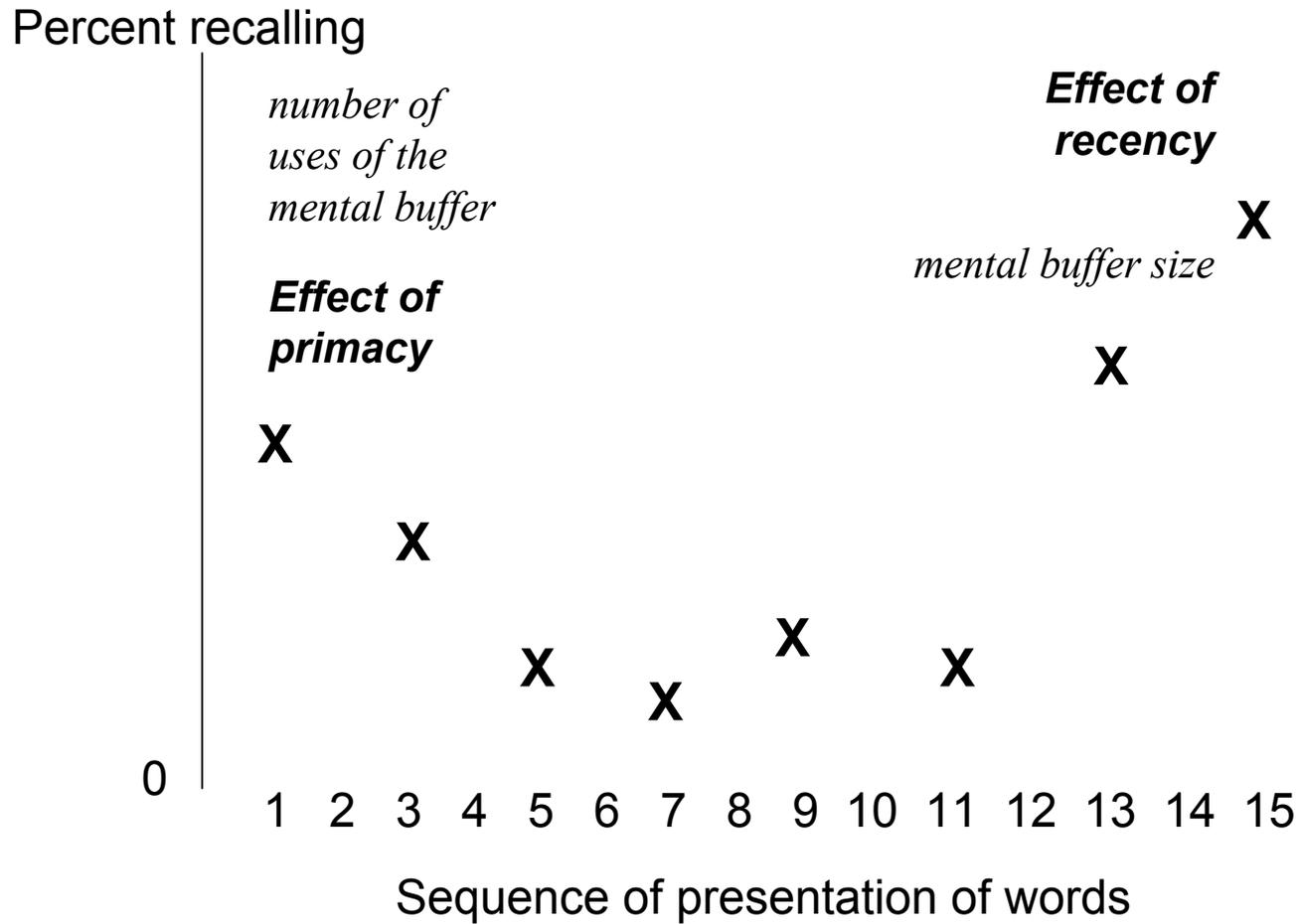
Effortful or effortless?   Focal attention or subconscious?
Test by competing effort,   Test by distracting attention,
e.g. look for spelling errors.   e.g. hearing lively music.

Evidence of a short-term store for a limited number of units (Murdock 1962 etc.)
[No evidence for fading of memories over time! (Forgetting is by confusion, not decay.)]

Percent recalling

number of uses of the mental buffer

Effect of recency

mental buffer size

Effect of primacy

0

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Sequence of presentation of words

**Conscious, subconscious & unconscious processes
in mental performance**

Conscious_ness_ is not a theoretical entity in science (a Thing)

Within the causal system that organises a life,
a particular _process_ at any moment
may be **conscious** or not …
A current mental process of a (conscious!) person may be --
conscious: expressable specifically; in attention/awareness;
subconscious: not expressable then, but can be accessed;
unconscious: influencing performance but never explicit.

Evidence for sub- or un-conscious processing ('priming'):
I can't say which particular 'stimulus' was presented;
yet what I do (or say overall) is affected by that specific.

• _What **I** say can show **any**one what **I**'m aware of & not aware of._ •
'First-Person' expression can reveal (betray!) 'Third-Person' performance

Conscious, subconscious & unconscious processes

More technically (Peter Merikle: detection; DAB: discrimination)

The joint criteria for sub[liminal per]ception are:

  <u>specific description</u> of the stimulus does <u>not</u> *detect* its presence

  nor *discriminate* between different amounts of stimulation;

  <u>overall responding</u> to the situation <u>does</u> *detect* that stimulus

  and/or *discriminate* between different levels of it.

Examples

Memory: what 'pops into mind' can be 'primed' by a clue/mnemonic.

Marketing: brand name of ice cream flashed onto cinema screen …

Mark & me: people at home sipped samples of their usual coffee

  in which we'd varied the concentration of caffeine;

  we asked first how much they liked each version -

  caffeine level judged the best varied among people;

  sipping each coffee again and saying how bitter it was -

  half the people couldn't discriminate caffeine's taste.[a]

Healthy uses: cut back caffeine in Coke or salt in bread[b] stepwise

  by a ratio that can't be discriminated (about 20%).

a.Booth&co1989 *Ann NY Acad Sci* 561, 226-242. b.Conner&co1988 *J Fd Sci* 53, 549-553.

The myth (inside as well as outside Psychology) **of the indeterminateness of human 'behaviour'**

"At the best, only probabilistic predictions can be made."
["Freedom of the Will requires unpredictability."]

Donald Laming (Exp. Psychol., U Cantab.): parameter-free prediction, exact in some circs., of sequence of recall from specifics of list-learning procedure (2006, *J. Exp. Psychol.: Lng Mem Cogn* 32, 1146-1163).

Primary (methodological) sources of the myth

1. Lumping of data from individuals before starting analysis

2. Failure to specify relevant outputs and most (or even any) inputs

Primary (theoretical) source of this procedural desperation:

No theory of the individual's performance is applicable to real life

1. Assume investigator's words directly read participant's mind

2. Mechanisms measured only for detection, not discrimination; yet:

- detection of a stimulus is useful only in 'emergencies';
- discrimination from normal is the basis of most performance.

Determinate theory of an individual in a scenario

<u>Discrimination</u> of multiple features from norm by one person
in a particular situation (Booth & Freeman *Acta Psychol.* 1993):
   sensed <u>material</u> features and <u>concept</u>ualised features
   on the same unit of discrimination sensitivity of an output
     - algebra of exact distances; - no loose parameters;
     - explains up to 100% of the variations in output.

Craving for chocolate (the other 'chemistry of emotion'!)
Varied aspects (input) of eight described chocolatey foods -
   (1) choc *vs* flavour, (2) sugar content, (3) amount of food,
    (4) vitamin enrichment.

Assessed aspects of each described food (output) -
   (a) craving, (b) sweet, (c) filling, (d) comforting.

Calculate differences & samenesses in mental throughputs.

Determinate theory of an individual in a scenario

Craving for chocolate

Two people (one a woman, one a man) evaluating described chocolatey foods:

• **Person A**: ***diagnosed processing*** ("best model"): $r^2 = 0.93$

Cravings explained by two different emotions, S/R//R mentation:

(i)   a feeling in common between filling-sugar choccy & filling-amount comfort

(ii) mixed-up feelings about vitamins - (not) comforting, choccy, sweet, filling

          later recall of what was in mind during the evaluations:

"[my] tiredness … hunger"; "sweet", "size", "like" of each item.
  I'm averse to addition of vitamins to make a food 'healthier.'

• **Person B**: ***diagnosed processing*** ("best model"): $r^2 = 0.98$

Cravings explained by two different sensations, S//S/R mentation:

(i) a sensation in common between sweet **&** filling in choc., seen in word 'sugar'

(ii) sensation in common in choccy choc. **&** comforting sugar, seen in amount described

          immediate recall of what was in mind during evaluations:

"sweetness of the chocolate"; "fun choc."; "comforting when tired"

These best fitting mental models *match* retrospective free recall.

N.B. a Third-Person account *of* a First-Person viewpoint.

<u>Psychological</u> theory - *not* brain theory, *not* sociolinguistics

All that theorising is about **mental** processes

(conscious or unconscious)

- *not* about changes in neural connections for a record of action,
    perception, thought and feeling (cp. DAB '70 Psyc Bull, '73 ed. Deutsch)
- *not* about historico-cultural mechanisms of the spellings or of the
    meanings of the words

Both brain (& body) and culture (& language) are necessary, but
  the mental causation observed and theorised about is neither.
        = <u>Neutrally monistic</u> <u>systems pluralism</u>,   i.e.
            one created reality, multiple types of causation
                                e.g. biological, social, mental

?By AD 2030+: clear formulations in a new parallel/superordinate science of
                        <u>individual</u> biosocial cognitive <u>development</u>
                (still later, engineered inorganic bodies educable into human society)

Development of the individual's biosocial mentation

A science of human ontogenesis, 'parallel' to the specialisms:
psychology, biological sciences, social sciences, humanities.

- but not just a being's start ("onto-" "-genesis"):
lifelong maturation of a human life – sociality, body, mind.

Autogony
(Greek: *autos* = self; *goné* = generating)
The Science of Person-Generation

What would this look like?   Cp. epigenesis. Cp. education.

Involves no *deus ex machina* such as ID.
Hebrews 1:3   "God of the glue, not of the gaps" (J. Wolffe, C-A-N- '06)

Uniqueness of humanity = ?the 'trajectory' of development
If so, may the image of God best be seen in a little child?!
Jesus said, "…the kingdom of God belongs to such as these" (Mark 10:14).

Development of the individual's biosocial mentation
'Autogony'

Autogony will have more surprises than even the specialisms
  (e.g., genetic expression, biosphere regulation, global economics).

Some (?small) surprises already; for example:-

<u>Genetics of language-specific disorders</u> (oral as well as written):
  Auditory deficits ('physical') largely environmental in origin.
  One 'mental' deficit is largely genetic - holding sounds in
    attention (the 'phonological loop': did you hear the sounds of
      the words, if you were rehearsing consciously?)
Dorothy Bishop (2006) 'Psyc informs genetics & vice versa' *Q.J.Exp.Psychology* 59, 1153-69.

<u>Parental imprinting of genetic disorders of development</u>:
  contrasting psychobiosocial ('behavioural') phenotypes
Prader-Willi syndrome - paternal shutdown of chromosome 15q11-q13
  'from age of 2, unable to stop eating'; rapidly becomes obese
Angelman syndrome ('happy puppet') - maternal del'n UBE3A@15q11-q13
  laughter/smiling, hyperactive; ataxia, feeding problems in infancy.
Yet the social behaviour depends on the current interpersonal environs: C. Oliver (2003) BJCP

Note also:
  Ontogeny does <u>not</u> recapitulate phylogeny of the biosocial self.

Mental mechanisms of rational choice:
Freedom of the Will **<u>and</u>** Psychological Determinism

Negative Freedom: your choices of the words to write down
from memory were totally free of external or internal constraint.

Positive Freedom: you chose each word for your own reasons.
Even if you just scribbled fast without thinking deliberately,
it was your mind that words popped into, and your reason for
rejecting a guess, searching for a word with a letter in it, etc.

Causal Closure: yet psychological science is only possible
if your choice of each word is in principle determinate
within the mental machinery that you brought into play
when I showed each word and when you wrote -- and
with which you have handled tens of millions of words
in utterances, writings and thoughts over the decades.

'Majesty' in Humanity

Is there a boundary or a gradation around the *Imago Dei*?

Many differences between human beings and apes etc.
Language. 'Fluid' intelligence. Tool-making. Size of brain.
Variety of habitats. Complexity of social groups. Religion.

Are these differences merely quantitative, not in category?
Some chimps have acquired signing, with (?)syntax.
Some crows (and finches) make tools, as do monkeys.
Whales have bigger brains (?but not more synapses).
Rats are also generalists (but commensally with us!).
Each "boundary" becomes blurred when studied in depth.

Instead, look for a theoretically specified basic <u>mechanism</u>
that can be experimentally tested, e.g. child *vs*. chimp
- perhaps from analysis inspired by field observations.

Jointly Intending: the 'Majesty' in Humanity?
perhaps the biosocial-cognitive *Imago* of
the loving within the Trinity and the love of the Sustainer

Capacity to take complementing roles in a shared task

Michael Tomasello and team (Leipzig M-P-I) have put forward
the experimentally tested theory, fitting existing field observations,
that the unique mental mechanism of *Homo sapiens [sapiens]*
among contemporary species on Earth is shared intention.

That is, we inherit brains and bodies and social cultures
which endow each of us with the capacity to work with others
in complementary ways towards the same goal,
be it material, social, intellectual, ethical, religious or any other.

Jointly Intending

(1) *Shared goal:* build a tower of bricks as high as possible -
Adult holds base steady while infant puts a brick on top.
When adult adds brick, infant takes role of holding base.
(2) *Shared task:* using a basket to hold things in -
Adult holds out a basket and infant puts a toy in it.
Adult picks up a toy and infant holds up a basket under it.

Not just awareness of the other's intention, object of gaze etc.

Not mimicking an act or emulating its effect (solo tower/basket)

Not merely acting in concert, i.e. doing own thing (e.g. both
adding bricks, putting toys in basket, pulling an object along)
Great apes do all of the above but only check, not share.

Human infants form joint intentions <u>and</u> speech at 12-14mths
(3) <u>Conversation</u> is turn-taking in elaborating on the joint topic.

biosocial psychology of jointly intending

Mental tasks most easily studied as structured games (in children)
or physical puzzles (in adults) - solo or duo (minimally social),
e.g., between an infant and an adult for shared tasks.

Naturalistic examples of youngster's participation in a shared task:
Shared actions: Pat-a-Cake - not (yet) seen in apes
Share experiences: gaze at each other while interacting;
not mimicry, e.g. one smiles, other vocalises happily.
Teaching-learning generally can be viewed as a shared task:
first the teacher leads/guides and learner follows;
then they take their roles simultaneously;
finally the learner leads and teacher corrects any error.
e.g., from being fed to feeding oneself with cup or spoon:
infant's hand over adult's -> adult's hand over infant's.

biosocial psychology of jointly intending

Tomasello: a scientific approach must identify ways of <u>refuting</u>
uniqueness of shared intention to human infants (and adults)

•Apes understand other's intentions, e.g. check what other is doing,
but do they <u>share</u> interests (want to share a goal)?
Chimps switch roles in hunts (Boesch)
but according to own main chance, not a shared strategy.
Apes point, and follow eye gaze, but just to the object,
not to its role in a shared goal . E.g., in the hidden toy game:
a child goes for the toy when adult points at one of the coverings
but an ape sees only the covering (Call & Tomasello 2005 review).

•If each claimed case of children's shared intentions was shown
either <u>not</u> to involve the child understanding the other's intention
or the child <u>not</u> to share the other's potentially joint goal.

Theorising about mental evolution needs
better psychological evidence from present humanity

Sociobiology / evolutionary psychology: <u>wrong way round</u> to scientific
understanding of distinctively human life – even just of its origins.

Paleontological evidence will always remain extremely <u>sparse</u>
(as well as there being no causal principles for preservation of
the most relevant evidence - unlike, e.g., the canon of Scripture).

Genetic structural evidence needs decades of further advance
in the <u>genomics</u> of human cognitive-behavioural 'phenotypes'
before it even becomes relevant to human uniqueness
since the common ancestors.

We need a good understanding of the <u>basic mechanisms of human life</u>
in common among healthy children and adults around the world
that do not exist in any other <u>contemporary</u> species (signing ape,
whale/dolphin, tool-using song bird, social invertebrate, ...).

Mental evolution needs better psychology (cont'd)

When we understand which basic mechanisms in children and adults
     don't exist in any other contemporary species,
then there will be adequately evidence-based theoretical constraints
     on cognitive-behavioural Just-So Stories.

A decent scientific theory of the uniqueness of the human mind is
     needed before taking seriously the interpretation of evidence
     - in the skull and skeleton of the gross structure and functions of
       the brain, hand, speech apparatus etc.
     - in stone artefacts, fossilised midden etc., for prehistorical
       technological and social culture.

Without a rich empirical theory of present human life,
     there can be no scientific basis for claiming that
       creatures in the image of God were first made
         10-12,000 years ago (first known farming settlements), say,
          rather than 40,000 (cave paintings) or 100,000 years ago,
           or even while skulls and skeleton clearly differed from ours,
             such as half a million or more years ago.

Biosocial cognitive mechanisms of religion

Scott Atran & Ara Norenzayan (2004) *Behavioral & Brain Sciences* 27, 713-770

"Agency detection"

We can perceive personhood (e.g. identity, mood, intention)
    in human movement (even just markers on the joints).
Therefore we will see personhood in other movements.
    The ultimate agent / power / person

"Meta-representation"

We can have conceptions about conceptions, e.g. evaluate
    a reason for acting, or appreciate the beauty of an idea.
Therefore we will see good or bad in anything conceivable.
    The ultimate value / good / perfection (& its enemy)

So, religions are: passionate (agentic power exerted)
                    costly   (good needs to defeat evil)
                    plausible   ("minimally impossible")
                    communal (group bonding: joint intentions)
                            * * * * *

?Genes for religiousness (pro-social) ?Lack = 'crime gene' (anti-social)
Not necessarily genetic nor environmental. GxE error = autonomy.   2006a,b,c

… as gratitude to the Creator

The triune God said, "Let it be" and it was so.
The Lord Jesus Christ is the sustainer of all things
        - the biosphere, human society, you and me.

God upholds the mechanisms of physics, politics and mind.
        God does not put the atoms in their places;
        God keeps creating the same causal powers
          - 'laws' of nature, including red in tooth and claw
          - 'laws' of society, including powers of this dark world

… as gratitude to the Creator
(continued)

Some open conceptual or empirical questions
(not presupposing that God exists):-

Can "all that God made" be "very good" and evil occur?

[R.M.Adams 2006]

[Liebniz] If God had not permitted certain evils, it wouldn't be you and me who exist, for God to love and to love God.

[sciences] Could there be causal networks that are incapable of producing biological or social disasters?

[psychology] Could there be a mechanism of personal choice without the possibility of doing evil?

Love that lets go and then goes to the rescue, all the way.

Thank you for listening

- and for taking part in a psychological demonstration!

Any comments?

- blank -
Machines and mechanisms
Self-building systems
Intelligent Design
Quantum physics & the mind
Complexity physics
Imago Dei = sociality
Wellbeing as objective QoL

'MECHANISMS' in Nature, Society and Mind

Causal processes (upheld by the Creator) of many sorts constitute galaxies, organisms, economies, minds and other systems. That is, minds *have* mechanisms *in* them.

People, politics, plants & planets plainly are ***not*** machines in the sense of contrivances of metal, plastic, silicon chips etc., fully designed and made from scratch by engineers.

Yet the etymology of 'machine[ry]' is strength and ability to enforce one's will(!) - the same root as 'might' (i.e., power), the [archaic] word 'main' in "with might and main" and the auxiliary verb 'may' which is used to connote freedom …

More importantly, computer science needs the concept of a 'virtual machine' - software that, not just is independent of which hardware it is implemented on, but also organises lower-level programs by its own criteria.

Self-building systems

To some extent we 'make ourselves'
    = use the mechanisms in us to create new things.

We not only procreate offspring; we educate them too
    = sharpen their intellects, shape their wills

+ Our own early choices may form our character.
+ Late creative decisions may re-form our character.

Cp. the "self-made man"
    but N.B. this involves his whole 'work-life balance'!

Mechanism and 'Intelligent Design'

(1) The improbability argument is absurd - cf. Van Till.
(2) Invoking "design" is beside the point:
    what are the <u>mechanisms</u> that have been designed
       to produce the ontogenesis of body and of mind?
Both fallacies arise from thinking of systems as
    nothing but collections of fundamental particles.
Development of a system (whether or not designed)
    is *nothing like* putting the atoms in the right places!

That is, "the God of the gaps" is not only
          a risky argument from present ignorance;
   it is obscurantist, blocking the search for mechanism
    - what the science of any sort of system must do.

The irrelevance of [quantum] physics to mind

The only **quantum** that can affect function of whole brain is
millions of transmitter molecules whose release generates
one discrete postsynaptic potential (EPSP or IPSP).

Could the physics of complexity encompass the mind?

Human bodies are subject to the laws of physics
but human thinking is not - nor family dynamics,
nor parliamentary democracy nor the legal system.
Conversely, the mechanics of walking or the railways,
let alone quantum mechanics and relativity,
aren't subject to laws of the land or to the popular vote.
Nor can the evidence of scientists or
the interpretations by historians
be legislated by any government
or regulated by any management.

What is Imaged?

Our minds are an echo of God's in sociality primarily,
not primarily in 'rationality':
Love is above Law (the Christian Gospel)

Empirically objective wellbeing

It has recently become a truism that
    GDP growth is not necessarily improvement
        by any humanly recognised standard.
    Politicians bewitched by the Finance Ministry's
        projections of tax yield and public expenditure.

Wellbeing cannot be made objective
    by physical data, on wealth or health
    by % of answers in polls on words, e.g. "happy".
Wellbeing is not rendered hopelessly subjective
    by ivory-tower postmodernists' 'interpretations',
        not checked back with those whose life it is
            (except in subjectively run focus groups).
<u>Objective wellbeing</u> is what individuals consistently say
    that they want out of life, in words agreed by others
        to have one meaning: "<u>outcome categories</u>".