Causes of productivity growth: insights and empty boxes

The RPI Insights Team

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Preliminary points

- ‘Growth’ is in the news and has high salience for economic policy, but background thinking on the causes of growth is minimal.
- The growth that matters for the material standard of living is productivity growth, not growth of GDP.
- The issues engaged are of a longer-term nature: roughly how to achieve a sustained increase in the ‘productive potential’ of the economy.
- They concern the ‘supply side’: short-term fluctuations in GDP caused by fluctuations in aggregate demand are not of any great interest.
- The aim of this session is to explore the relevance of some of the background thinking of the RPI Insights Team for productivity growth.
- Expect to hear words like ‘gestalt’, ‘systems’ and ‘cognitive neuroscience’!

A poor gestalt

Documents

New approach to ensure regulators and regulation support growth (HTML)

HTML

Details

This Action Plan sets out the next steps to our approach on regulation and regulators. It includes a range of pledges from regulators to support this effort. It will enable a regulatory system that supports innovation and economic growth while ensuring accountability for the quality of regulations introduced, as well as the way in which independent regulators implement and enforce them.

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Regulation for growth

Explore the topic

A “range of pledges”, aka a ‘Magpie’s nest’?

- No serious attention is paid to:
  - holistic understanding/appreciation of the functioning of the regulatory eco-system (considered in the context of the wider socio-economic eco-system).
  - clearly defined aims or principles to be followed.
  - diagnosis of current dysfunctionalities.
  - choices made as to which challenges to take on and which challenges to leave aside, at least for the moment (matters of priorities and sequencing).
- In sum, none of the major elements that together might comprise a strategy.
- Instead: straight to what is called a ‘plan of action’, but is no plan of action at all (just pledges, made with fingers crossed behind backs?).
- *‘All plans of battle fail on first contact of the enemy’* (FM von Moltke the Elder).

The economics of attention (Loewenstein & Wojtowicz (LW))

"Adam Smith and his contemporaries established economic science around the idea that physical factors of production -- the classical trinity of 'land, labor, and capital' -- were the primary resources driving the wealth of nations. Over the ensuing centuries, successive generations of economists have elaborated on this perspective by emphasizing the importance of additional intangible factors -- most notably technology, human capital, and information -- that came to play an increasingly prominent role in subsequent eras of economic development."

(Journal of Economic Literature, September 2025.)

Pluses and minuses of L&W

- On the positive side, the recent attention given to the concept of ‘Attention’ is very much in line with Insights thinking at the RPI, which has stressed the learnings to be had from the relatively new, and fast developing, field of cognitive neuroscience about how to design an information discovery, information processing and decision-making system for economic governance.
- On the negative side, the summary development of economic thought over the ages is a travesty of reality. It’s a sort of ‘Whig view of history’, in which there is a steady progress based upon cumulative learning.
- To see travesty, let’s start from the ‘neoclassical’ growth model (developed by Solow and Swan (1956)), look forward from then, and then look (a long way) back from then.

Growth implications of the basic model

Notation: Q = output, K = capital, L = Labour, and T = 'level of technological knowledge' (taken as exogenous, i.e. beyond the scope of the analysis). "RoG" denotes 'rate of growth', "a" and "b" are paraments (also exogenous)

- Output:

RoGQ = a*RoGK + (1-a)*RoGL + b*RoGT

- Labour productivity.

RoGQ – RoGL = a*(RoGK – RoGL) + b*RoGT

- Total factor productivity:

RoGQ – a*RoGL – (1-a)*RoGL = b*RoGT

- A veritable empty box! (And note that 'Land' has disappeared from view.)

Subsequent development: endogenous growth theory

- The ‘neoclassical’ model having come up empty – summarised in the expression that technical progress ‘falls like manna from heaven’ -- there were attempts, starting in the 1980s, to broaden the model, most notably by the explicit inclusion of factors such as human capital and innovation.
- The sentiment was obviously right, but the advances have been highly limited: *"too much of it involved making assumptions about how unmeasurable things affected other unmeasurable things.”* (Paul Krugman)
- Plus ‘energy’ inputs and biosphere constraints suffered relative neglect.
- So, not much filling of empty boxes here.
- It did, however, make the media headlines in Britain in 1995 when Gordon Brown, then Shadow Chancellor, made reference to *‘post-neoclassical endogenous growth theory’* in a speech to an assembly of economists.

An Oxford Response: Ode to Post Neoclassical Growth Theory

(in the style of William McGonagall, last six verses)

But when, later, wise men asked where all the growth came from / Then many, even great economists, were struck dumb / All the statistics that they gathered were quite clear / The hard toil of people and machinery were small beer

Only inventions seemed to have any effect / And from where these arose everyone was quite bereft / So people then began to get rather weary / Of the once almighty neoclassical growth theory

But then new analyses, oh so subtle / Questioned all this and led to its rebuttal / A new explanation arrived, over which there was quite a fuss / Technical progress – innovation, ideas – were "endogenous"

Ode to Post Neoclassical Endogenous Growth Theory (cont.)

Invention was crucial but needed embodiment / In people – in skills – and in capital investment / So these were important to make growth shine / ***Although others had known this for a very long time***

All this was important to men in Whitehall / Who hadn't had much luck with growth rates at all / Now they had reason to spend on capital, education and skills / And made sure this happened through many Parliamentary Acts and Bills

This was very much favoured by one Gordon Brown / Who soon became much the biggest man in town / And if critics did all this approach then query / He answered "it's post-neoclassical endogenous growth theory”

Pre Neoclassical Growth Theory 1

"The greatest 'improvement' in the productive powers of labour, and the greater part of the skill, dexterity and judgment with which it is any where directed, or applied, seem to have been the effects of the division of labour."

- NB This is not some obscurely sourced citation: it's the first sentence of *The Wealth of Nations*.
- "Skill, dexterity and judgment" is a shorthand expression (for expositional purposes) which can be expanded to include characteristics like ingenuity (an example of which is given a few paragraphs later in Chapter 1 of the book), enterprise ('initiative and resourcefulness'), curiosity, motivation, entrepreneurship and the like.
- **All are examples of what later came to be called 'individual human capital'**

Pre Neoclassical Growth Theory 2

- If the accumulation of human capital is the prime driver of productivity, a next question is: how is such capital accumulated?
- The broad answer is by ‘learning by doing’ or ‘learning from experience’.
- And the specialisation entailed by the division of labour is key to the speed of that learning by focusing, sustained attention (‘cognitive endurance’) on a relatively limited range of tasks.
- Feedback loops were added later: eg higher productivity -> higher incomes -> higher and more differentiated demand for goods and services (expansion of markets) -> a deeper division of labour -> higher productivity.
- Attention to drawbacks were also introduced later: eg too much time, effort and attention devoted to narrow, routine tasks can degrade cognition for other matters.

Lost gestalts 1: Entanglement

- In the later development of economic thought, ‘labour’ (L) at the macro-level of theories such as that of Solow-Swan has come to be thought of in terms of time and effort applied in the production/supply of goods and services of value to others.
- This misses a major insight of the Smithian gestalt, which is not just that human capital (H) be added to K and L in growth models (as in endogenous growth models), but that individual human capital of the types identified in the Wealth of Nations be recognised as non-alienable from time and effort applied. Labour and capital are supplied jointly (‘entangled’).
- Thus, for example, the income tax and national insurance paid by employees in any period is a tax on their individual human capital in that same period, and hence a disincentive to its further accumulation.

Lost gestalts 2: Entrepreneurship as a form of human capital

- The concept of entrepreneurship is something of a ‘ghost in the machine’ of the dominant strands of post-classical economics (the AustrianSchool being an exception). Like ‘human capital’ it is not explicitly named by Smith, but is implicit in the analysis, particularly in relation to the function of ‘merchanting’ (The French got to the naming first, as with ‘Parliament’!)
- This is Jean-Baptiste Say’s characterisation of entrepreneurs: *“individuals who create value in an economy by moving resources out of areas of low productivity into areas of higher productivity and greater yield”*.
- This is a form of human capital focused on the reconfiguration of available resources and it is particularly valuable in times of change, when fluctuations in the economic context disrupt the effectiveness of routinized, established ways of doing things.

Lost gestalts 3: It's systems analysis 'all the way down'

- Word count from *The Wealth of Nations*: 'Laissez Faire', 0; 'Invisible Hand' 1; 'System(s)', 250.
- The economy is a complex adaptive/evolving system engaged in the discovery & processing of information and the consequent taking of decisions/actions. In *The Wealth of Nations* it is referred to as the 'Commercial System.'
- And the appropriate cognitive response to its inspection and to the understanding of it is the development of a 'system of thought'. (Book IV of the work, one of the five books, is itself titled *"Of the Systems of Political Economy")*.
- In these information and decision-making characteristics, the economy is similar to the brains of humans (and other animals) -- which function on the basis of complex 'divisions of labour' of their own.

What can we learn from the functioning of the brain?

- *"The concept of a system is fundamental in cognitive neuroscience. Though areas differ in the operations that they perform, they do not operate in isolation. To put it bluntly, no behavioural task depends on a single area of the brain. … … The fact that there are separate or 'parallel' pathways means that different operations are carried out simultaneously: we see at the same time as we hear. The overwhelming advantage [of this structural architecture] is in the speed of processing."* (Richard Passingham, Emeritus Professor of Cognitive Neuroscience. Oxford University, in *Cognitive Neuroscience, A Short Introduction*.)
- In short, the human brain is characterised by a highly complex 'division of labour' of its own, just like the economic system that it is occasionally called to reflect upon (a case of one complex system 'mapping' another). So, the question is: what can we learn from the structure of the brain?

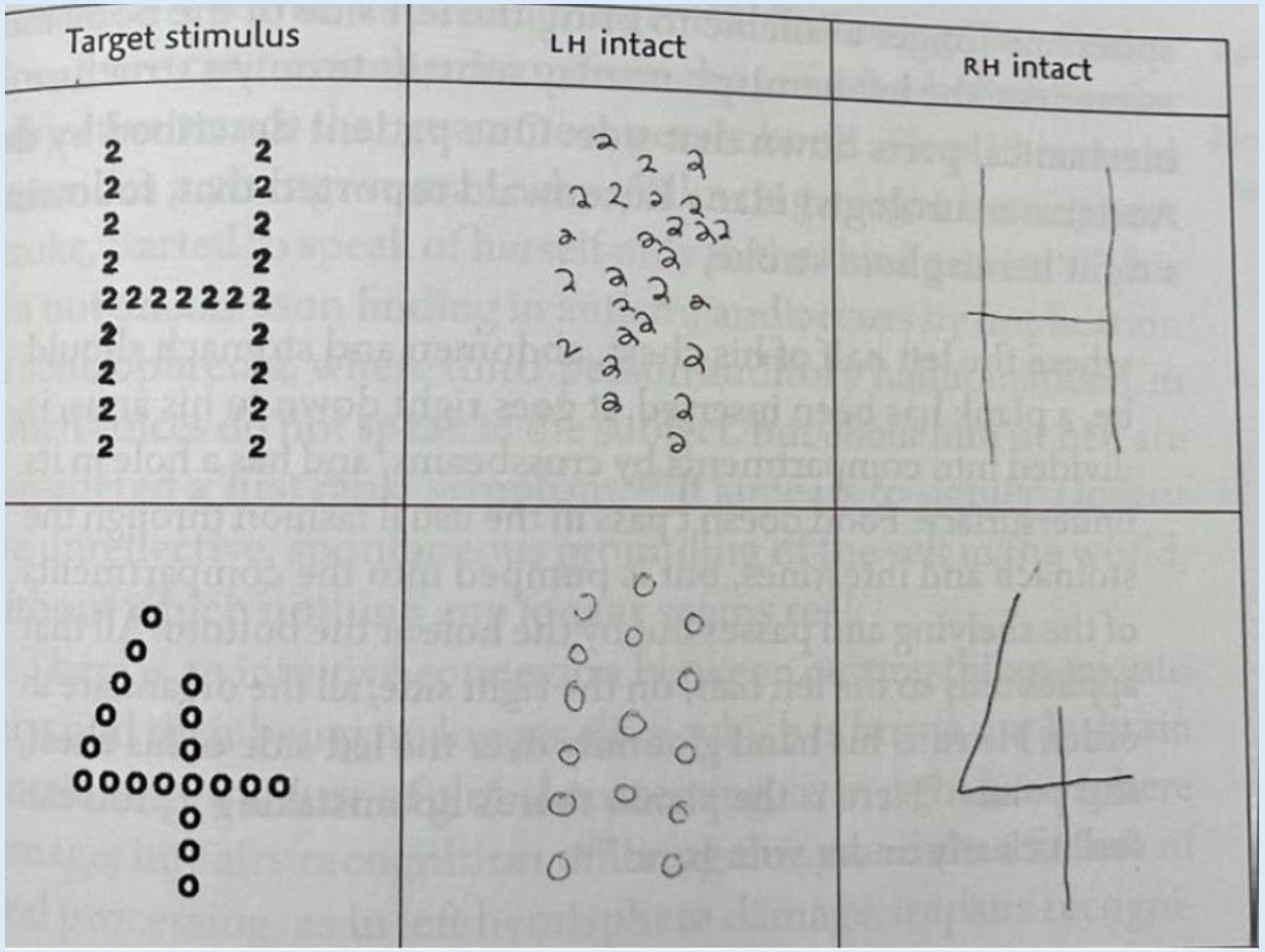
The Return of the Robin Redbreast

Two eyes, two brain hemispheres, two different ways of processing visual information simultaneously, two actions (peck, fly), apprehending vs comprehending

Picture credit: Scottish Wildlife Trust

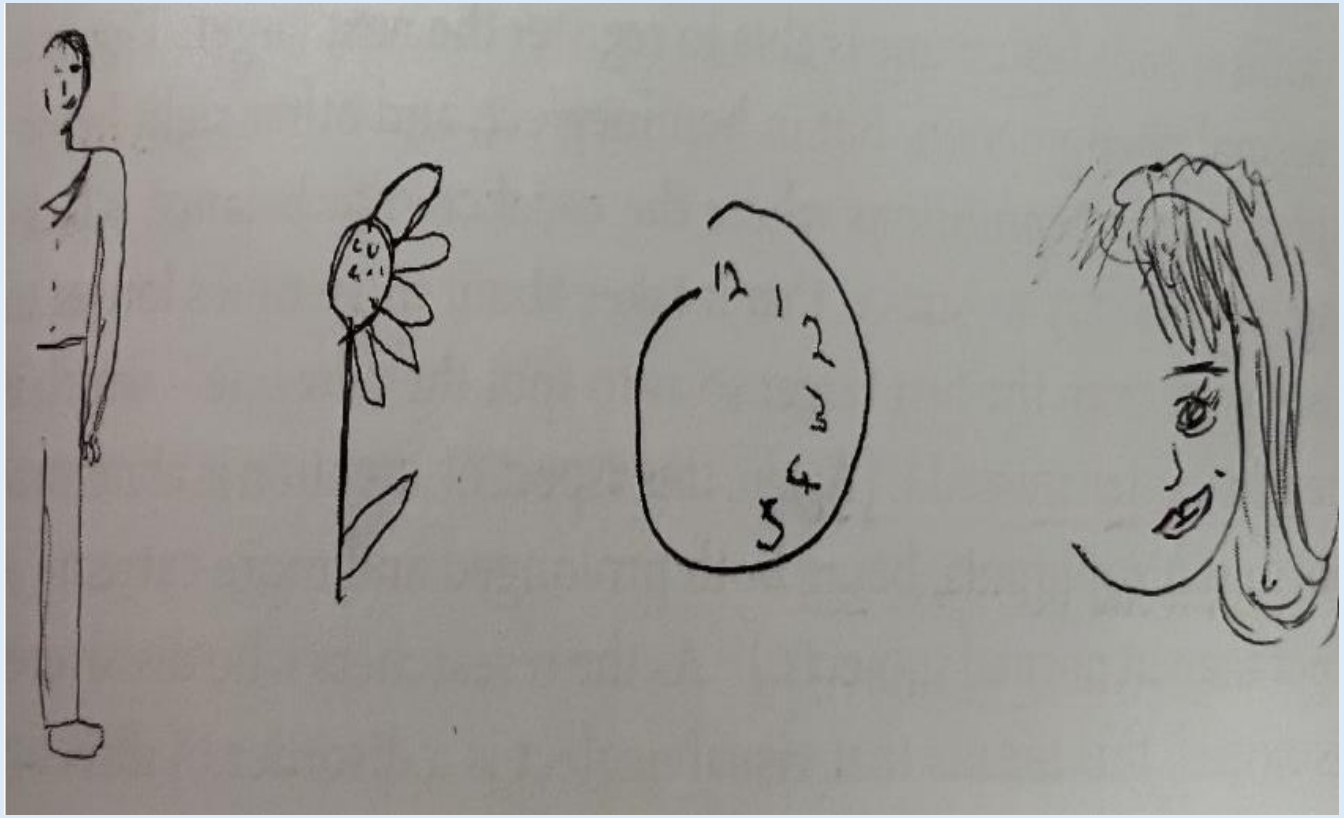
Early cognitive neuroscience 1

(effects of brain lesions according to location)



From Iain McGilchrist, *The matter with things*

Early cognitive neuroscience 2 (Hemineglect)



From Iain McGilchrist, The matter with things

Conclusion: The importance of system structure

- How we conceive of things is a function of the structural organisation and effectiveness of the information processing system.
- In the conduct of public policy, it's not just a matter of paying more attention to the problems (although getting appropriate attention paid to salient issues is a challenge in its own right): the outcomes will depend upon how we see things, on the 'gestalts' formed inside our own heads, individually and collectively.
- As Keynes put it: *'the particular must be contemplated in terms of the general'*, and the latter ('the general') entails *the conceptualisation of the connections between the particulars*, i.e. a wider, more comprehensive 'gestalt'. **The current structure of government provides little or no capacity for doing that, which is why we characterise it as 'half brained'.**

End questions: seeing the wood from the trees

- In the Smithian ‘gestalt’, the division of labour (and changes to it) is guided by market exchange processes (themselves facilitated by institutional forms of human capital such as markets and money) and by competition.
- These are absent in the structures of government, as they are also in the brains of animals.
- But is there, in effect, a weak form of competition in the brain that might be mimicked in a reformed structure of government that had much greater parallel processing capabilities? (In the brain the sub-systems process information in different ways, but the processed streams are brought together and weighted for salience/value for the purposes of taking actions.)
- Can the capacity to view the socio-economic system holistically be itself viewed as a specialised functionality, albeit that is one notably foreclosed in present structures? If so, how might such foreclosure be mitigated?

End propositions for discussion

- The division of labour in government – and, more generally, its ‘network topology’ – is seriously maladapted for the tasks that are taken on.
- This is particularly so at the top: Number 10; Cabinet Office; Treasury.
- Low governmental productivity is to be expected: it shouldn’t be a surprise.
- Because of its dominant, monopolistic influence on the whole Commercial System, the productivity performance of the economy is systemically depressed by the low-performance of the governance sub-system.
- Redesigning the policy system should be strategic priority #1 for any government dedicated to promoting productivity growth.
- A good start on that is realistically feasible and, in the words of the RPI’s unofficial motto (an old Irish proverb), ‘a good start is half the work/journey’.