Artificial Intelligence and Expertise: the Two Faces of the Same Artificial Performance Coin

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Outline

In the field of Psychology

Gottfredson [1997] got 52 signatories for a definition of intelligence:

> *Intelligence is a very general mental capability that, among other things, involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience.*

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No broadly agreed, precise definition yet. (Mackintosh [2011], Urbina [2011], Willis et al. [2011], Davidson and Kemp [2011], Franklin [2014])

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- Not only goal fulfilment, efficiency too

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- Intelligence is about performance
- But expertise too!
- And it has already a well agreed definition! (Ackerman [2011], Ericsson [2006])

Expertise vs. Intelligence

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- Expertise = special skills/knowledge, but intelligence too
- Expertise is about a particular domain (**domain-relevant** skills/knowledge)
- Intelligence is about genericity (**domain-generic** skills/knowledge)
- Both are complementary aspects of high performance.

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About Relevance and Genericity

Domain-relevance:

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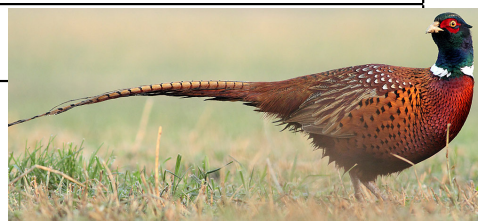
Hunting	**Generic**	**Specific**
Relevant		Hunt pheasants
Irrelevant		



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- Most generic: skills on/knowledge about the agent itself.

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Works corresponding to AI' would mainly relate to AGI (e.g. brain emulation).

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- Intelligence as expertise acquisition
- Technological singularity vs. expertise evidence

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- Analysis of recursive self-improvement

Thanks for your attention.

Questions?

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Formal definition of intelligence

Legg and Hutter [2007b]

Achieve goals in a wide range of environments:

- Observations o_i + rewards r_i + actions a_i
  $(o_1 r_1 \rightarrow a_1 \rightarrow o_2 r_2 \rightarrow a_2 \rightarrow \dots)$
- Agent $= \pi(a_i | o_1 r_1 a_1 \dots o_{i-1} r_{i-1} a_{i-1} o_i r_i)$
  (probability of actions given history)
- Environment $= \mu(o_i r_i | o_1 r_1 a_1 \dots o_{i-1} r_{i-1} a_{i-1})$
  (probability of observations and rewards given history)
- Total reward to be maximised $= V_\mu^\pi$ (various models)
- Priority to simple μ (Kolmogorov complexity $K(\mu)$)
- Intelligence $= \sum_{\mu \in E} 2^{-K(\mu)} V_\mu^\pi$