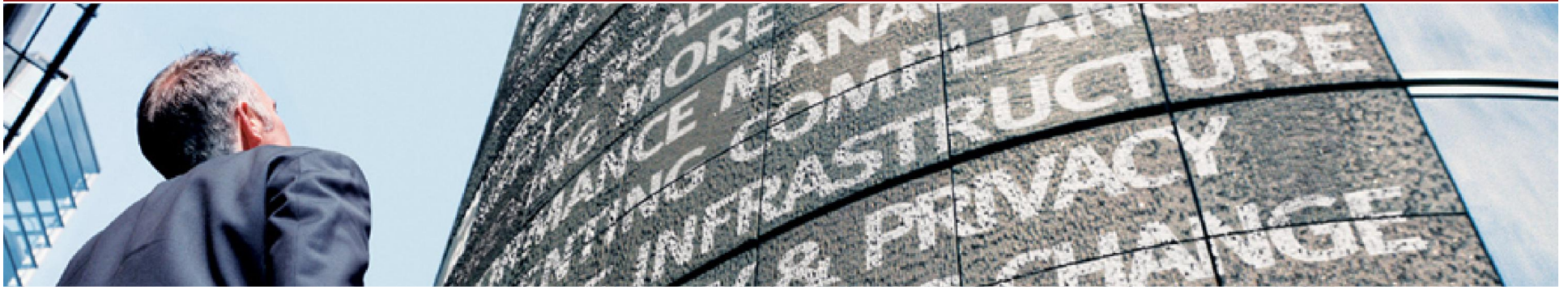


Demographic Shifts (and IT)



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Research Fellow and Group VP

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Fears about automation (60's)

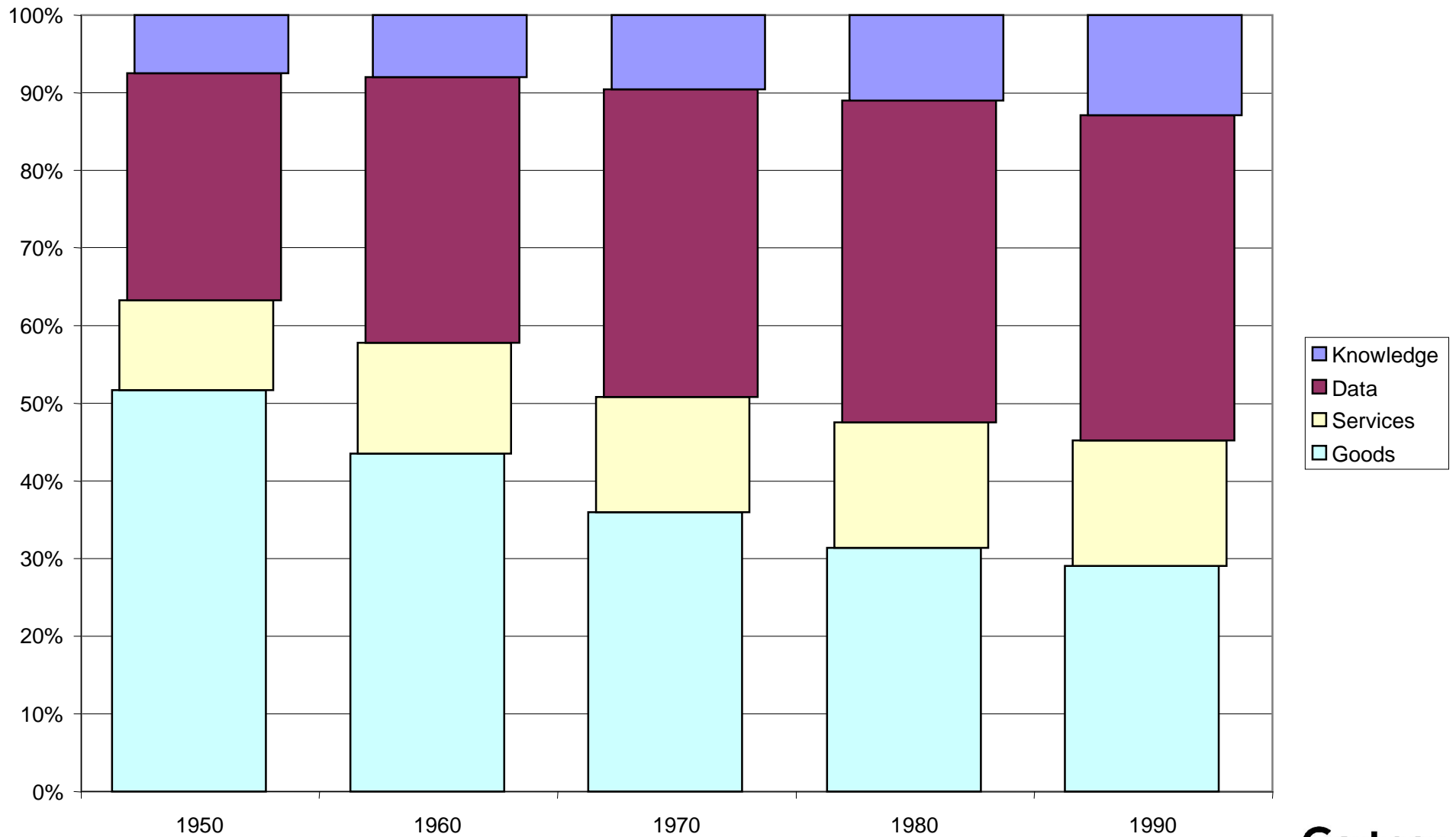
- n Adjusting to automation as America's greatest domestic "challenge" of the sixties (JFK, 1962)
- n “Disemployment of the nervous system” (Gerard Piel, Sci. Am. Publisher)
- n Annual job displacement of 300,000 (BLS) – others estimated 2 million or more (American Foundation of Employment and Automation)
- n A world ruled by machines (Teller)
- n Destruction of
 - lower middle class (factory automation)
 - upper middle class (artificial intelligence)

From 1964 through 1999, the workweek contracted 0.5%

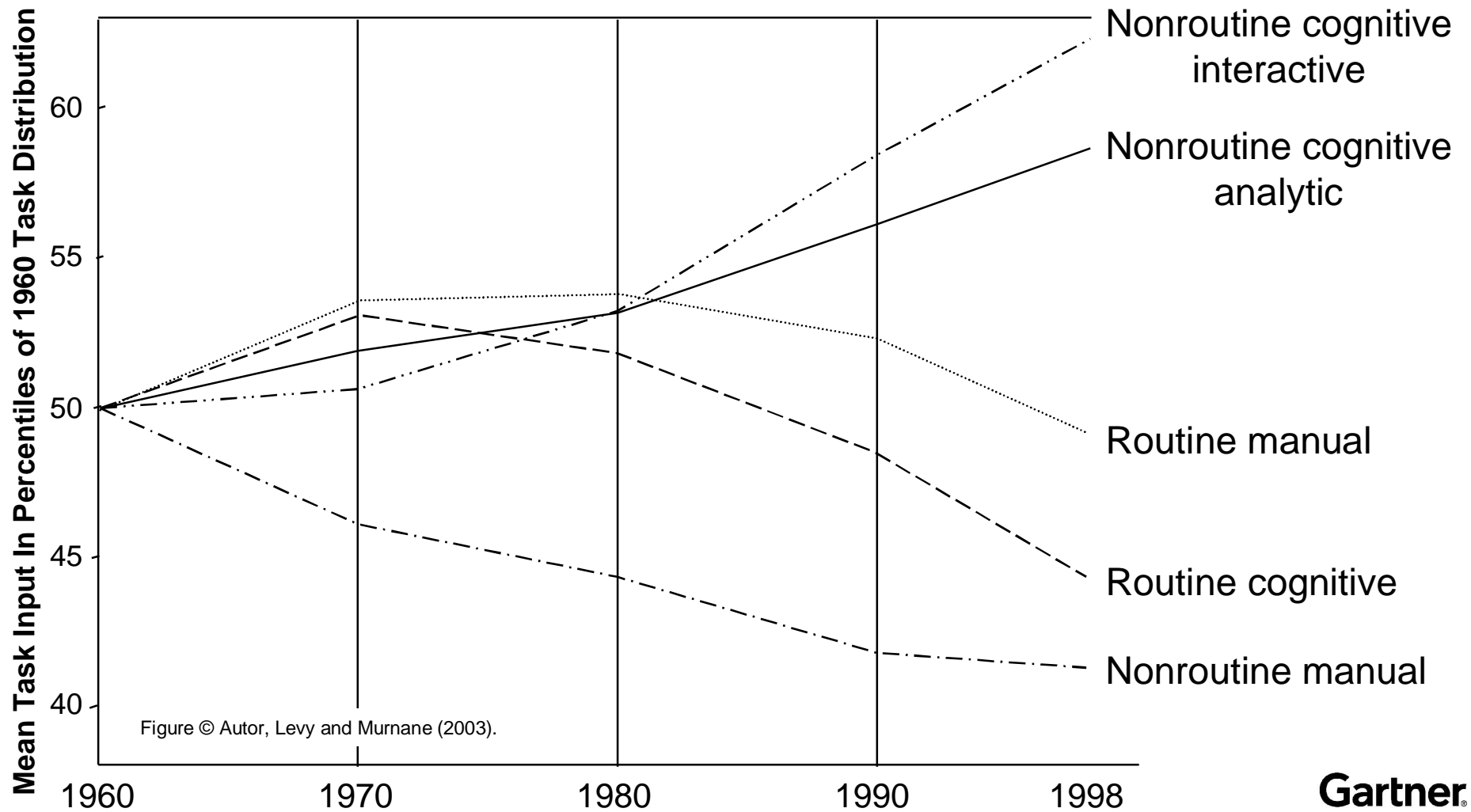
Current Population Survey (household data).

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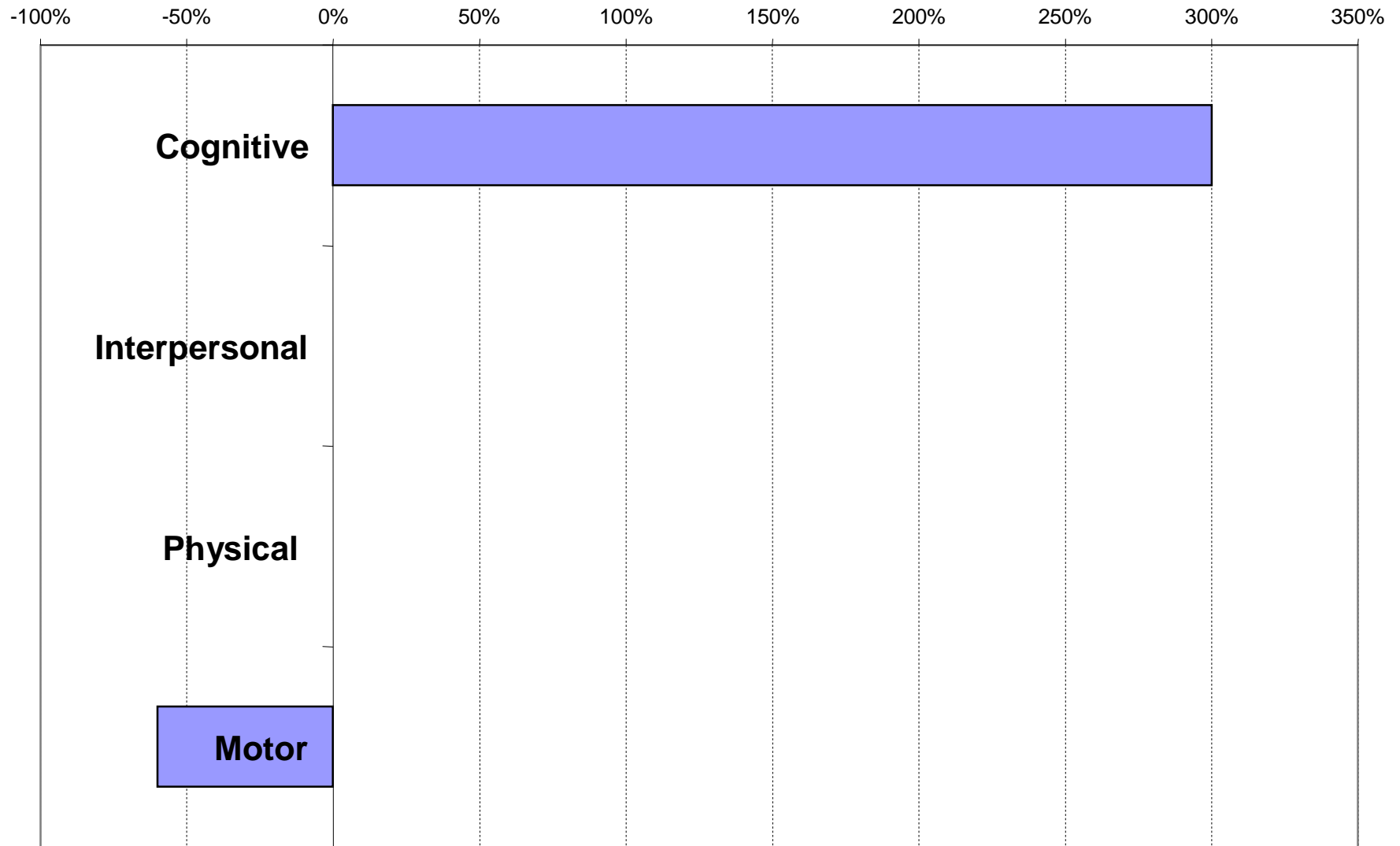
US Employment by Type of Worker



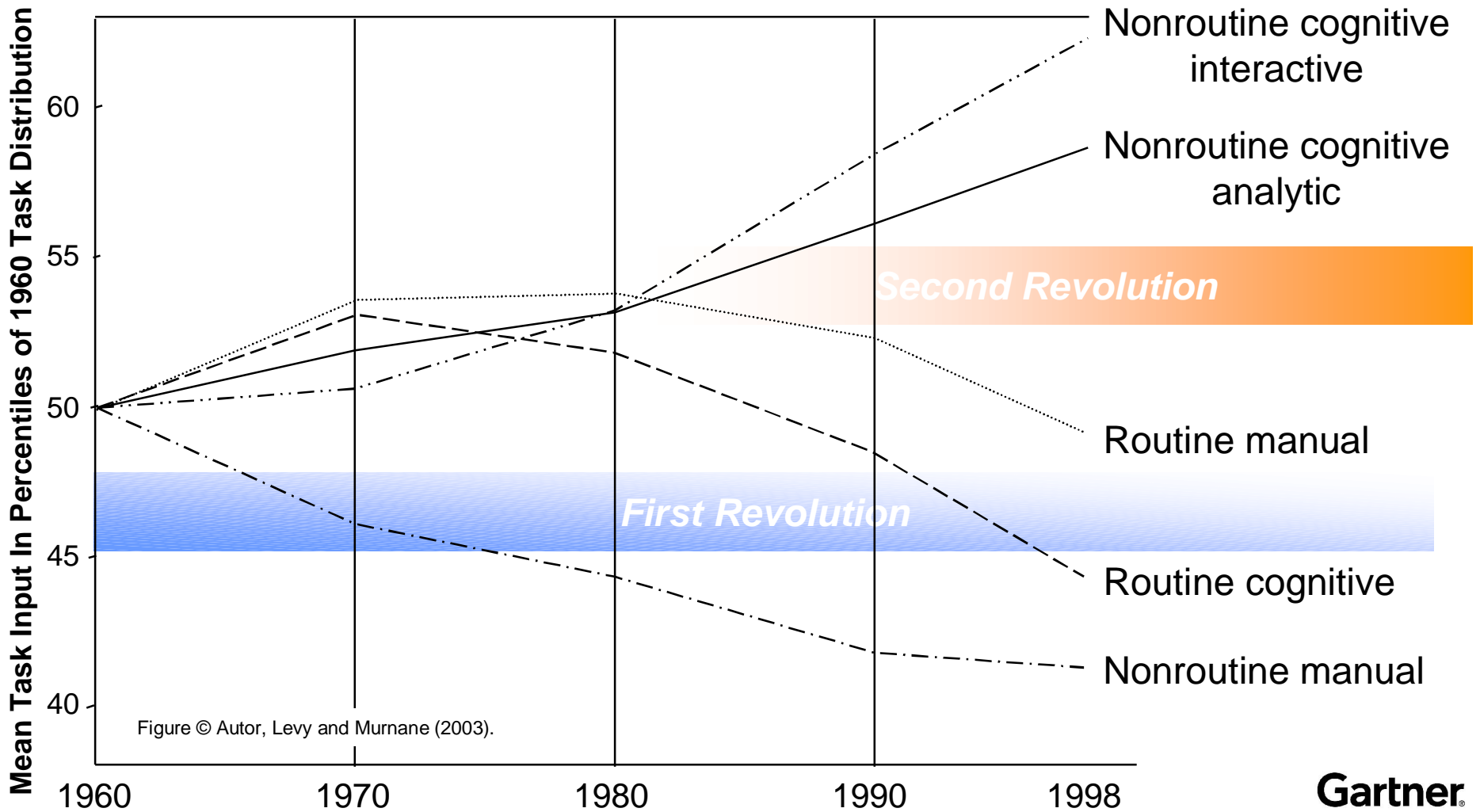
Demographics Trend: Historical Employment Mix Changes



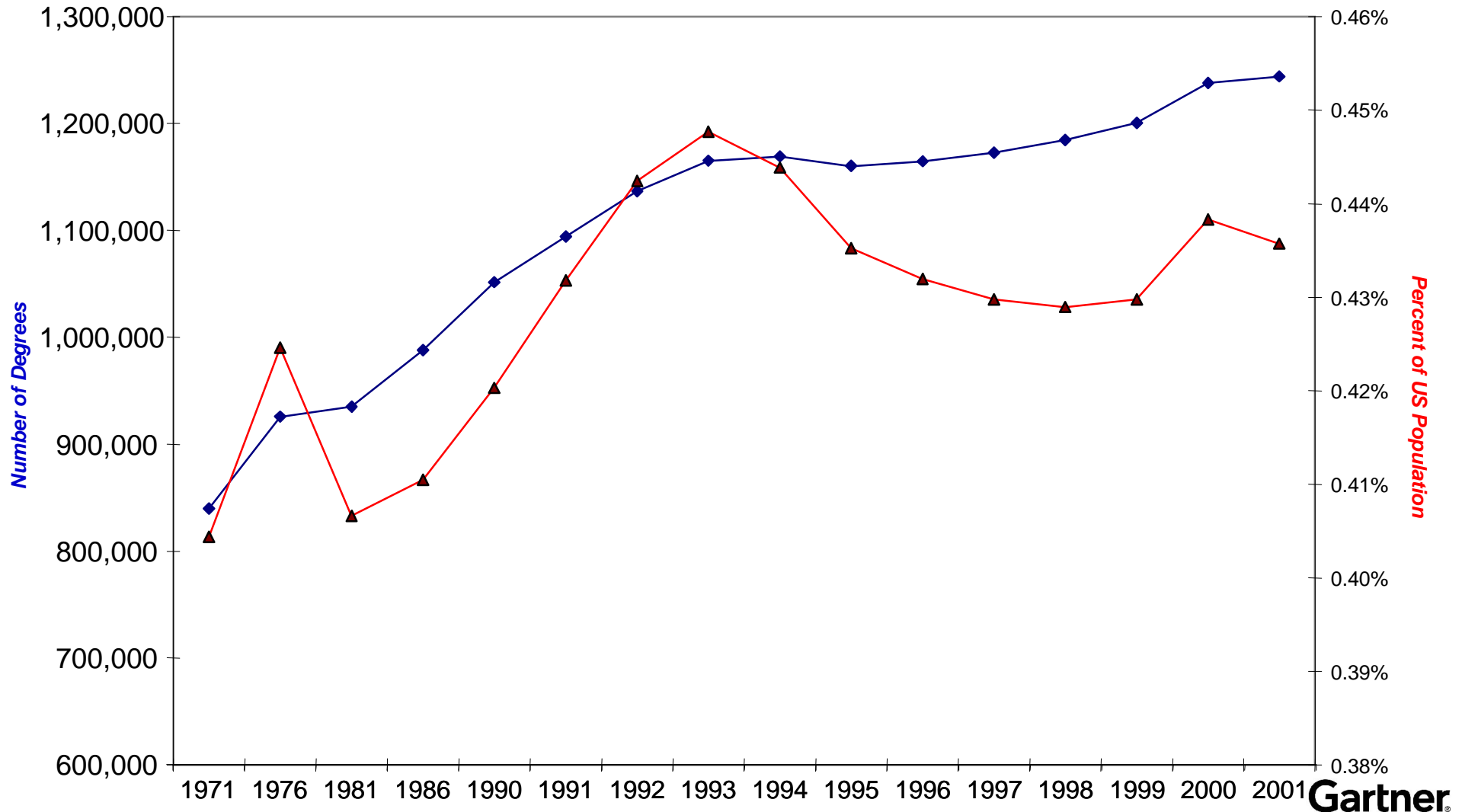
Return on Skills (68-90)



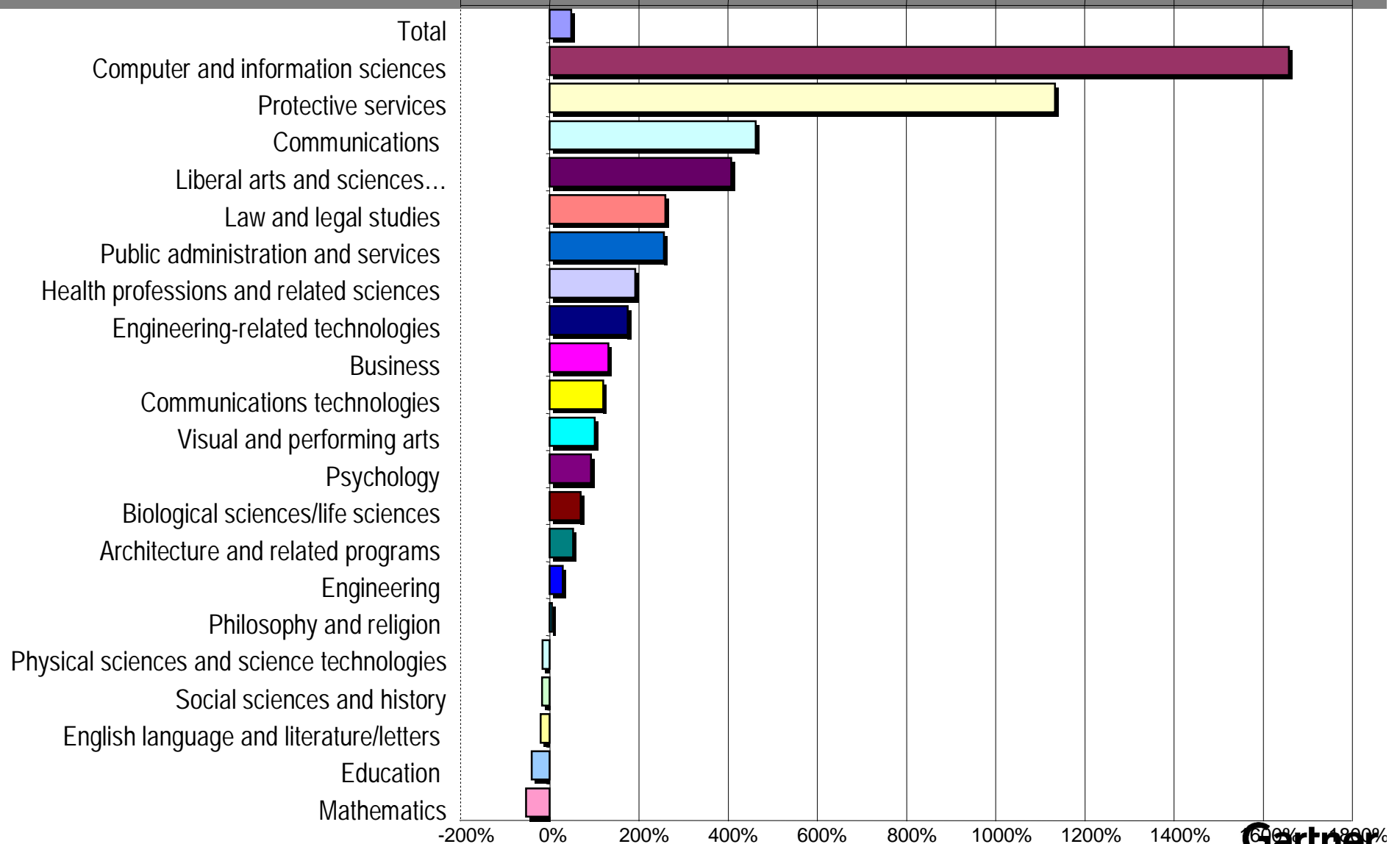
Demographics Trend: Historical Employment Mix Changes



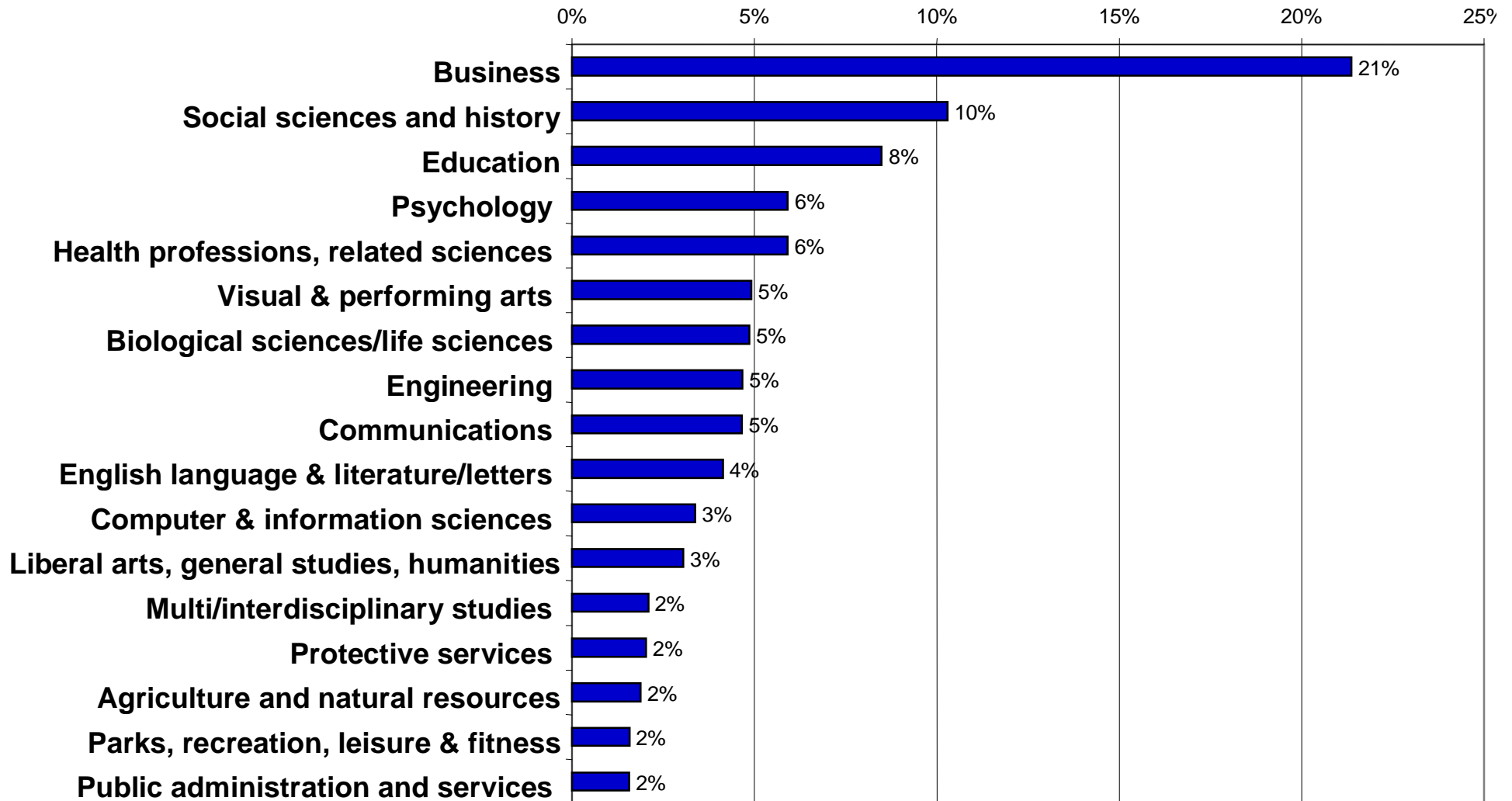
Bachelor's Degrees Conferred



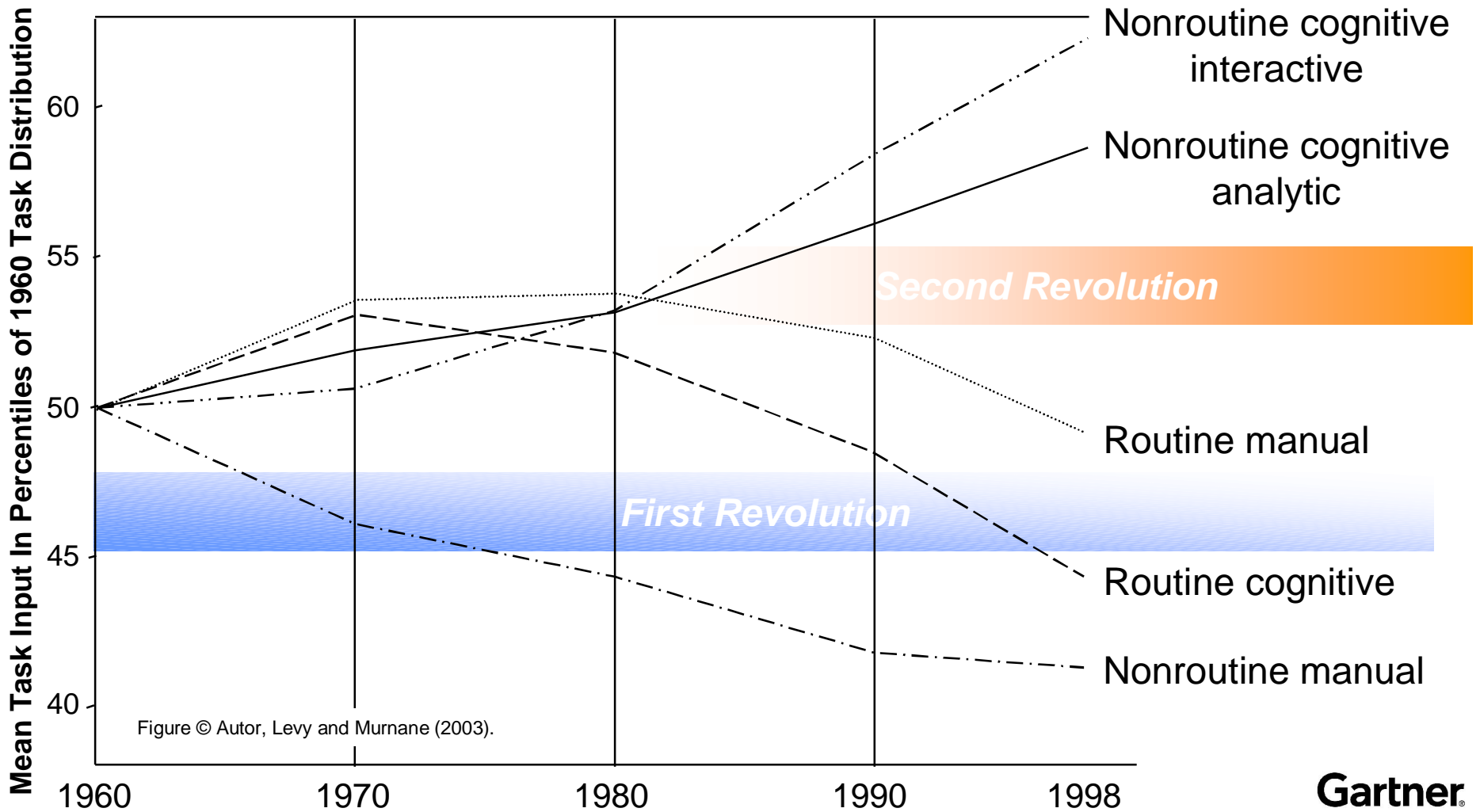
Change in Degrees By Major, 1971-2001



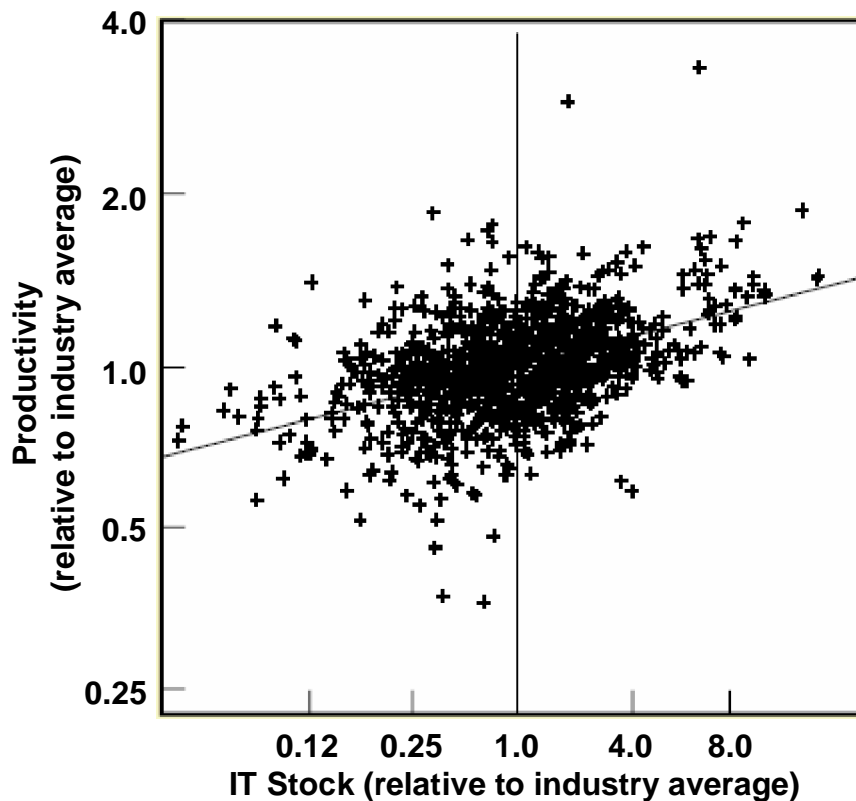
Bachelor's Degrees Granted – 2001



Demographics Trend: Historical Employment Mix Changes



IT ROI



Annual Productivity Change

	High	
Decentralized Authority	+ 1.6%	+ 4.6%
	0	- 3.66%
	Low	High
	IT Investment	

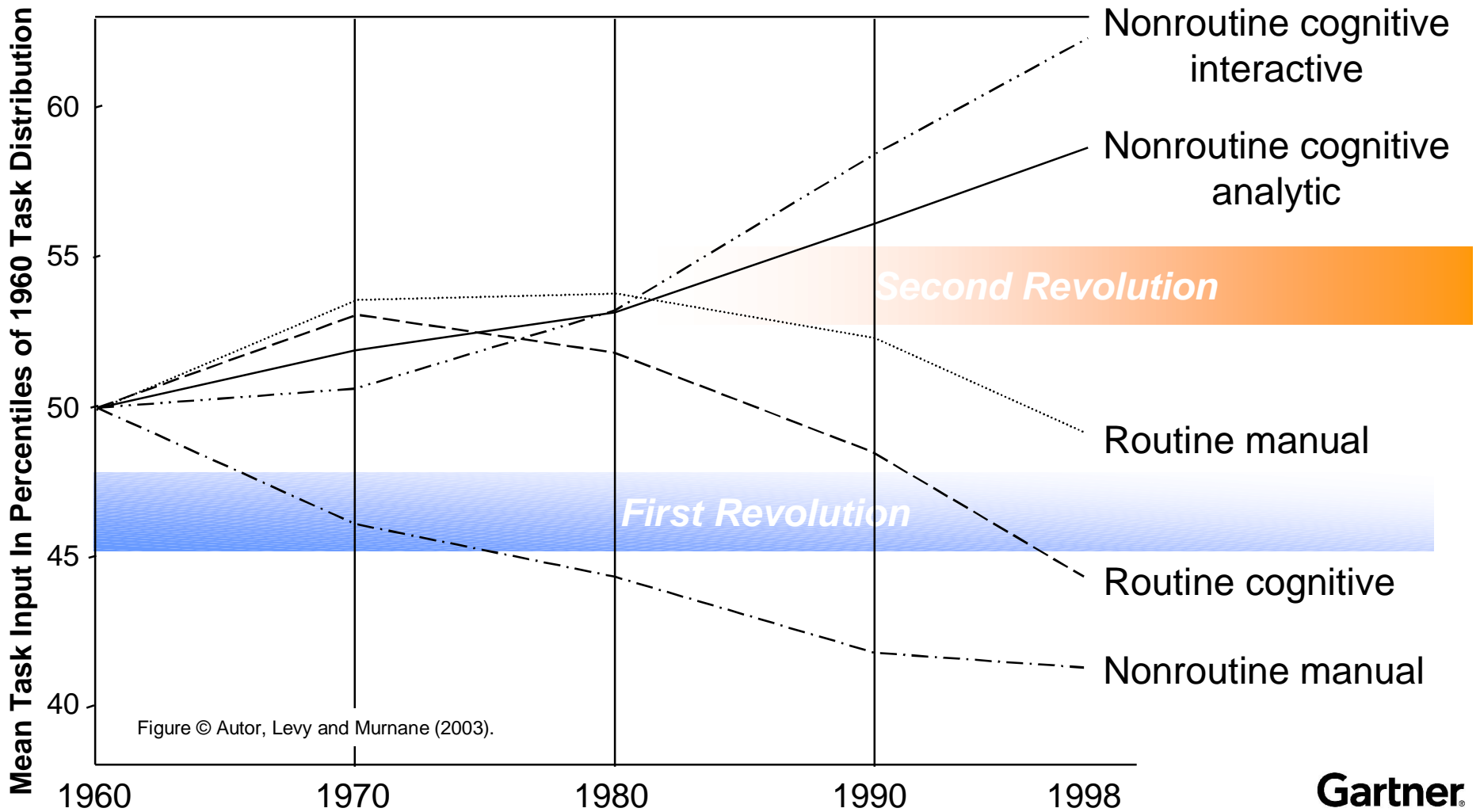
- **Delegate Decision Rights**
- **Information Access**
- **Low Cost Communications**
- **Communications Culture**
- **Teamwork**

IT enabled changes in decision making structures

Decision-Making structure	Communications cost	Individualization, able to use many minds simultaneously	Ability to resolve conflicts	Autonomy, motivation and creativity
Centralized Hierarchy	Low	Low	High	Low
Loose Hierarchy	Medium	Medium	Medium	Medium
Democracy	High	Medium	Medium	Medium
Market	High	High	Low	High

(T. Malone, *The Future of Work*, 2004, HBS Press)

Demographics Trend: Historical Employment Mix Changes



Socio-political Implications

- n Automating the routine has a social cost
 - Salary inequities
 - Training and retraining issues
 - Education, skills and immigration
 - Trade policies

- n So does augmenting the nonroutine
 - How many jobs requiring nonroutine cognitive skills can the economy generate?
 - What's the right work week length?
 - What happens to the leisure-work split?

End

Story

- n Net: Demand for non-routine cognitive growing fast but no commensurate acceleration in education...but there is talent overseas.
- n 96 NYU – growth in KWorkers, etc.
- n *04 UC Irvine – comp: 3x cognitive work, ½ motor skills; people skills and strength didn't grow \$*
- n Autor work – ramp in non-routine cognitive
- n Education data – no commensurate acceleration
- n Shift towards decentralized authority, improved communication and info access (Brinjoisson) [Consumes IT and non-routine cog skills]
- n Shift in IT investment balance between automation to augmentation
- n IT staffing prediction
- n Discuss: Social/Political Implications to consider

The Human Residual

- n What's left after everything's automated?
- n Are there any jobs left?
- n How does IT relate to those people that remain?
- n (Where does everyone else go?)

Revolutionary Epochs

n First Revolution

- More than 40 years old and still going
- Substitute computer capital for human capital
- Automation, cost reduction, raise productivity
- May be approaching asymptote

n Second Revolution

- 15 years young
- Clarke's "Natural Born Cyborgs" and personal empowerment
- Augmentation, not automation
- Rise of nonroutine cognitive tasks
- Behaviors, not objects

Augmenting Nonroutine Cognitive Behaviors

Behaviors

- n **Analyze** (discover, find, realize, recognize patterns, detect anomalies)
- n **Create** (invent, innovate, engineer, redesign, apply inventions of others, realize and adjust)
- n **Lead and oversee** (processes and people — monitor, motivate, supervise, coach, direct)
- n **Solve problems** (monitor, discover problems, note deviations, handle exceptions)
- n **Communicate** (inform, cajole, solicit, propose, commit, tell, share)
- n **Team** (forming, storming, norming and performing per Tuckman, 1965)
- n **Execute** (consider, select, decide and otherwise act or perform process steps)
- n **Learn** (acquire, develop, understand, expand, diversify, assimilate, apply)

Conceptual Outcomes

- n **Blockbusters**
- n **Exploitation**
- n **Tweaking existing processes**
- n **Managing existing processes**
- n **Task execution**

Perspectives

- n **Qualitative enhancement (primary)**
- n **Process and task decomposition**
- n **Process redesign**
- n **Quantitative capital substitution**

Second Revolution

- n Augment, not automate
- n People focus
 - Behaviors, Tasks, Processes, Skills
- n Design center
 - Extend, enhance, empower, enlighten, enable
 - CRM alternatives
- n Builds on, doesn't replace, first revolution principles

IT Implications

- n More cognitive workers engaged in nonroutine tasks
 - Harder to control
 - Require more investment
 - Supplementing skills (or off-shoring)
 - Less amenable to automation
- n Narrower, higher impact, higher visibility investments
 - Targeted behavioral augmentation
 - Non-deterministic process elements
- n IT doesn't do touchy-feely work
- n Far tighter integration with LOB and strategic objectives
- n Evolving into an agent of change?