Modern Approaches to linking perception and physiology

• Blake (1994):
  ‘Strategies for determining the ordering of functional stages of vision’
  Note: an implicit assumption: one can talk about ‘order’..
  Tools (‘inferential strategies’):
    - Relate to known anatomy/physiology: example: the falloff of Vernier acuity scales w/cortical m.f., not retinal gang cells density
    - ‘Unique stimuli’: illusions, Julesz, binocular rivalry
  Summary table in page 23

• The first wave (late 60’s – present): spatial frequency and orientation channels; relation to electrophysiological findings

• Graham and Nachmias, 1971:
  - The experiment: measure contrast detection thresholds of compound gratings in two conditions, ‘peaks-add’ vs. ‘peaks-subtract’
  - Their un-intuitive/surprising result: the amplitude that counts is that of the components, not the compound
  - Why is this interesting/important? (what’s the agenda behind?)
    - Fourier analysis, linear systems analysis
    - “Independent channels”: knowing the response to the each of Fourier components alone enables one to predict responses to new ‘compound’ stimuli

• Piotrowski and Campbell 1982:
  - The importance of phase for pattern appearance
  - Why is phase important? (hint: edges..)

  - Can we (should we, even) reconcile the two studies?

• Blakemore, 1972: Size constancy and spatial frequency adaptation
  - Background: after prolonged exposure to a hi-contrast grating, the contrast detection threshold of that grating increases (=subject is less sensitive) – commonly called ‘adaptation’
  - The idea: use adaptation to ‘probe’ other processes in the system
  - Experimental setup: adaptation, then test in diff distances to gratings of the same retinal vs. perceived spatial frequency
  - Result: adaptation maximal to the retinal spatial frequency
  - Their conclusion: the visual process(es) that produce size constancy occur after the stage of spatial-frequency analysis of the image.

• Burbeck, 1987: Test spatial-frequency discrimination (instead of c.d.t.)

• Weisstein 1970: ‘hi-level’ factors?!
• Modern ‘Psychoanatomy’: Blake, 1994; Polat and Sagi 1993; Adini and Sagi 2001
• ‘Neo-Gestalt’: Shimojo et al. 1989; Nakayama et al. 1995