Signaling Theory.
Very weak Tests, Weak Tests, and More Sophisticated Designs in the Social Sciences

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Why this conference?

- CSF (Centro Stefani Franscini), the International Conference Center of the ETH, sponsors international and interdisciplinary conferences.

- Signaling theory is an important research program, truly interdisciplinary, bridging social and natural sciences with applications in: economics, biology, sociology, anthropology, psychology, political science, law, philosophy, even chemistry and other disciplines.

- To my knowledge, this is the first time that we are able to gather so many eminent researchers from various disciplines to discuss models, applications, problems and perspectives of signaling theory.
Two Reviews of 25 to 30 Years of Signaling Theory


• Formal models, equations, diagrams

• Examples: insurance, education and labor market, finance (e.g. amount of firm’s dividends), advertisement for experience goods, “limit price“ deterring entry, warranties, credible announcement of government policy, monetary policy etc.

• Forerunners in economics: Vickrey, Mirrlees, Akerlof, Spence

• Spence, Michael 1973, Job Market Signaling, QJE 87 (1344 ISI citations as of October 2012). (No citation of Zahavi)


• No formal model, no equation, no diagram

• Examples: Conspicuous consumption, „unconditional generosity“ (e.g. Hawkes 1993 report of Hadza hunting, food sharing, collective action problems, altruism, prestige. Wasteful behavior (e.g. Mauss, potlatch). „Artistic elaboration“, architecture, religion etc.)

• Forerunners in sociology: Veblen, Mauss, Bourdieu

Origins of Signaling Theory

• **Bring the two worlds together:**


Competition for tallest buildings in the Hanse town of Lübeck in the Middle Age

Cathedral established by Nobility and bishop 1230.

115 m
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Cathedral established by Nobility and bishop 1230.  
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St. Mary. Established by merchants: 1350.  
125 m
Rise of investment cost increases demand! Veblen’s „Candle Light Dinner“: An explanation/prediction by rudimentary signaling theory. A change in investment costs („handicap“) either erodes old or creates new signaling possibilities

Thorstein Veblen (1899) argues that an upper class candle light dinner was impossible 30 years ago (in mid 19th century) because candles were very cheap and common. (See also Zwecker 2007.)
Principles of the Theory

Asymmetric Information: Sender A knows her quality but receiver B does not:

1. A has an unobservable quality (reproductive success, health, trustworthiness, ability etc.)
2. A benefits from an interaction with B.
3. B benefits from an interaction with A in case the quality is high (Type A+) but B experiences a loss if the quality is low (Type A-).
4. A is able to send a costly signal to B to advertise his quality.
5. A+ has smaller signaling costs than A-.
6. There is a signaling equilibrium provided type A+ has a positive net benefit from an interaction with B (benefit minus signal costs) while the net benefit of type A- is negative. Then A+ will signal, A- will refrain from costly signaling and A+ and B will interact.

(Zahavi’s „handicap principle“. A+ can afford the handicap, i.e. the investment in a costly signal pays off and, therefore, honest signals emerge.)

(Extensions to continuous quality scale and continuous signal intensity is straightforward. There are many extensions of the basic model.)
The essence of the „handicap principle“ is – in hindsight – a very simple, but wonderful idea with rich and very fruitful scientific implications -- as many important discoveries.

This principle solves many puzzles:
• Alarm calls in animal populations, explanation of the peacocks‘ tail etc.
• Altruism in groups and new solutions to the collective action problem
• Waste of resources in many human activities and seemingly irrational social norms
• And many more …
In his book „Law and Social Norms“ (2000) Eric Posner suggests a theory of social norms based on signaling theory. The key idea is that actors have different discount rates. A+ types have low discount rates (large „shadow of the future“) and, therefore, they are interested in stable relationships. A- types have high discount rates and prefer to enjoy one-shot interactions („fly-by-night type“). (For a formal model see Przepiorka and Diekmann, 2012. Eu. Soc. Rev.)

Posner applies this idea to many social phenomena: norm compliance, the „voting paradox“, discrimination, nationalism etc.

Although his theory is a stimulating contribution he may have overstretched the radius of applications.

Testing Signaling Theory

• Many studies pretend that they have applied and confirmed hypotheses from signaling theory. However, are the tests employed really convincing?
• Researchers test predictions of the theory. But in many cases there are competing explanations of the empirical findings.
• Hence, one should carefully look for experimental or other designs so that it is possible to discriminate between alternative explanations.
Prediction: Signals should be observable

Thaler/Sunstein, 2008, Nudge:

Toyota Camry, two versions:
- a) conventional engine
- b) hybrid

Toyota Prius
- Hybrid version only

► Hypothesis: Driving a hybrid car is a costly signal that the owner cares for the environment
► Driving a Camry is a very noisy signal, driving a Prius is an undistorted signal.
► This is one of the reasons for the success of the Prius and its high sales (see also Griskevicus et al. 2010)
“Going Green to be Seen”
(Griskevicius et al. 2010)

Experiment 2: “Status and conversation in public versus private“.
Subjects were to choose green or non-green products. For example, a less luxurious but more environmental friendly North Face backpack versus a more luxurious non-green backpack. Private = online shopping. Public = (hypothetical) shop.

Result: Status-oriented subjects choose more green products in public.
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Public = hypothetical shop. "Public" because contacts with sales persons and other customers. Is this "public"? Public display means: Using the "green" North Face backpack in daily activities (seen by friends, colleagues, neighbours) no matter whether the product was bought online or in a conventional shop.
Seen but not green - Did he want to signal that World Bank President's salary is too low?

Former Worldbank President Wolfowitz visiting a Mosque in Istanbul
Prediction: Signals pay off for the sender.
„Social benefits of luxury brands as costly signals of wealth and status“
Nelissen and Meijers (2011)

Female confederate wore a green sweater a) without brand label and b) with brand label. The confederate with a clipboard tried to make contact with shoppers asking: „Hello, do you maybe have time to answer a few questions.“ Figure shows proportion of agreement.
Social benefits of luxury brands as costly signals of wealth and status
Nelissen and Meijers (2011)

2. Rating of videos showing applicants for lab assistant. Applicants wore white shirts a) without and b) with Tommy Hilfiger label.
Appropriate hourly wage rated by subjects:
a) 8.36 €
b) 9.14 €

3. Charity Donations for Dutch Heart Foundation
a) Average donations without brand label: € 0.19
b) Average donations with brand label (Lacoste): € 0.34
Author’s extrapolation: Foundation would earn extra money for 133 heart transplantations at a cost of 25,000 €.
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Prize of shirts: ordinary label Slazenger: 11.85 €
Lacoste: 34.95 €
Tommy Hilfiger: 29.95 €

„Handicap“ or investment in signal is no more than about 18-23 €!
Why doesn‘t everybody fake the signal? Because the small handicap one should expect a pooling equilibrium and the effect should vanish.
Estimating the signaling benefits of educational credentials

Both human capital theory and signaling theory predict that productivity and wages increase with education and many economists doubted that it would be possible to discriminate between human capital theory and signaling theory by empirical data (Author 2004).

How to discriminate? Look for students of same ability, assign diplomas by random and measure income (Author 2004)!
Estimating the Labor Market
Signaling Value of GED

Tyler, Murnane, Willett (2000)

- GED = General Educational Development
- „Second chance“ to high school examination for dropouts.
- Passing standards vary with states and TMW exploit this property for estimating the signaling effect, if any, of GED.
- Same ability group with score 40 – 44.
- GED in e.g. Texas, no GED in New York.
- HK prediction: no differences in wages.
- Signaling: Higher wages for GED.
\[ \alpha = T(GED) - C(NoGED) - (T(GEDH) - C(GEDH)) \]
(e.g. Texas) (e.g. N.Y.) (adjustment factor for same ability 40-44 labor market differences)

\[ \alpha = (9628 - 7849) - (9981 - 9676) = 1437 \]

For white. Signaling effect of GED is about 20\%.
GED is costly signaling („handicap“) and employers pay for it.

► This is a very nice and sophisticated design!
Arabian Babblers

- They have morning dances
- They feed each other
- They like to play
- They breed collectively
- They compete for altruistic behavior

Zahavi 1990, Amotz Zahavi and Avshag Zahavi 1998