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Bubble Studies: The Brass Tacks

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1. Bubbles across Disciplines

Bubbles are usually associated with situations in finance, where the price people are willing to pay for an asset by far exceeds its fundamental value (Vogel 2010): The infamous Dutch tulip frenzy story shows that what is worth but a few cents today, was 10 times the annual income of a skilled craftsman in March 1637 which translates to close to a million USD today. Other textbook examples include the South Sea and Mississippi excess about a century after the tulip bulps, the US stock market as of 1929, the Japanese real estate and equity markets of the 1980s, the dot.com craze and Internet stock boom of the 1990s … and of course the balloons, frenzies and speculative mania in the world economy leading to the global market crash of 2007-8 for which we are still in the midst of the aftermath.

Trading assets requires investment, in finance, typically cash or some other sort of liquid, readily available and easily transferable, means. There are many instances where we invest liquid means to create a perceived value on a daily basis without ever thinking about it. Items like "likes", upvotes, comments, re-(tweets), selfies, emoticons are invested and traded daily online expecting returns such as visibility, sympathy, understanding, status, influence, power, respect ... . Sometimes these largely cost-neutral liquid means all get invested in a few assets, blowing its traded value way out of proportion. Sometimes the liquid means chase the wrong assets and overheat the value of a social asset — from sympathy over fame to hatred. Accordingly one may speak of opinion bubbles, political bubbles, bullying bubbles, status bubbles, fashion bubbles, art bubbles even science bubbles (Hendricks 2014a; Hendricks & Hansen 2015). These bubbles may push collectives of people – sometimes even computers – in the same (often) jinxed direction; (a) thinking the same thing; (b) acting in the same apathetic way when they witness somebody in distress online (Hendricks 2014b) or offline (Rendsvig 2014); (c) holding the same polarized opinions in politics (Peng 1994; Layman et al. 2006); (d) appreciating the same art; (e) “liking” the same posts on social media (Centola 2010); (f) upvoting the same reviews (Muchnik et al 2013); (g) purchasing

the same brand names; (h) subscribing to the same research program in science (Budtz Pedersen & Hendricks 2013), etc.

The person with the greatest number of Instagram-followers in Denmark – about 1 million – is a young gentleman named Benjamin Lasnier. He has one apparently obvious qualification: People think he looks like Justin Bieber. From this look-a-like feature Lasnier initialized a carefully planned marketing campaign posting photos factoring in different time zones for maximum exposure and eventually climbing to fame, product placement offers for clothing and accessories, record contracts all based on cyber-social bubble economics — everybody believes that everybody believes that there is something of value here. It's a bit like day-trading in a stock where nobody really cares whether there is a fundamental value attached to the asset. As long as others believe that others believe that there is some value, then that's good enough for trading and making a buck, getting respect, status, recognition, influence or some similar notion of social capital (Hendricks 2014d).

On April 23, 2013 Associated Press tweeted: “Breaking: Two Explosions in the White House and Barack Obama is Injured“. The tweet was quickly identified as a hoax, the AP’s Twitter page had been hacked. But by then the US stock market had crashed. It had taken only minutes and caused “the fear index”, to surge 10%. The market apparently lost almost USD 200 billion according to USA Today. That's what (re-)tweets can do for you ... an opinion bubble of "innocent" (re-)tweets creating market panic among real traders as well as computers (Hendricks 2014e).

During the 2012 Election the Obama campaign team jumped on reports about Mitt Romney's finances, issuing statements and strafing Romney on Twitter after *Vanity Fair* and the *Associated Press* published stories raising questions about his blind trusts and offshore holdings. There was nothing to the tax-haven stories. But political parties and political stake-holders may be tempted to think about which political themes or debates may get elevated political attention — and anger, fear and stories of indignation often enjoy huge social transmission (Berger 2013) creating political bubbles where truth and political capital part company. Social media are excellent for padding such political narratives especially the ones flirting with activity mobilizing sentiments like anger and indignation.

One may invest an opinion on the free market place of ideas online from social media platforms to opinion aggregators and a certain idea or stance, whether political, religious or otherwise, may at a certain point gain popularity or prominence. Respect, fame, power, influence in turn become social assets in no small measure by the number of people apparently subscribing to them in terms

of easily available and transferable liquid means like likes, upvotes, clicks, selfies or similar endorsements of often minimum personal investment. The result may be that everybody is trending the same way as a result of *social proof* (Cialdini 2007) where individuals assume beliefs, norms or actions of other individuals in an attempt to reflect the "correct" view, stance, preference, behavior for a given situation. Social proof together with the manner in which the individual agent process the available information about other agents' beliefs, norms and actions may align groups. But this allineation may simultaneously be independent of whether this mode of operation is necessarily tracking the truth or is the right thing to do — irrational group behavior or wrongful belief aggregation fuel bubbles (Ofek & Richardson 2003; Hansen, Hendricks & Rendsvig 2013).

Bubbles may be identified in other disciplines than finance furnishing a generic definition where

> *A bubble is an (often) irrational way of collectively aggregating beliefs, preferences or actions based on social proof in a bubble-hospitable environment*

The guiding research principle of the new field of *Bubble Studies* is that bubbles significantly amount to *information control problems* among deliberating agents who are collectively susceptible to robustly demonstrated socio-psychological features like boom-thinking, group-thinking, pluralistic ignorance, bystander, bandwagon and lemming effects, which together with determinate market conditions may make for bubble-hospitable environments in which bubbles of opinion, preference and action may grow — in as well as out of control.

The idea is thus to redefine and expand the study of bubble phenomena across different ontologies by

1. focusing on the socio-psychological phenomena among individuals leading to often irrational group behavior facilitated by imperfect or wrongful information processing among group members influenced by social proof,
2. using bubble models in economics (Brunnermeier, 2008) to study social assets "social capital", "opinion", "fame", "recognition", "respect", "power", "influence" apparent in other "markets" (agent interactive settings) with particular emphasis on the information-driven dynamics and thus study bubble formation, bursts and deflation across traditional domains and disciplines,
3. uncovering, in a novel way, the *formal structure and dynamics*, provide *simulation* and *experimental results*, offer *resolutions* of, and *recommendations* for avoiding, the bubble or lemming behavior of agents reasoning and processing information in concert.

By aligning problems of bubble formation in miscellaneous markets with information control problems Bubble Studies brings together philosophy, economics, logic, mathematics, social

psychology, information theory, behavioural science, and computer science to form a novel and thoroughly interdisciplinary platform for analyzing and resolving often destabilizing bubble-phenomena of human and market interaction and answer central questions like:

- To what extent, and in which way, are phenomena like pluralistic ignorance, cascades, polarization, bystander effects and other group-psychological biases and erroneous reasoning responsible for macroscopic coordination phenomena like boom-thinking in religious or ideological opinion, the emergence of trends, changes in climate of opinion in science, the strange bubble economics of "selfies" and group-recognition, group-think in opinion bubbles on the web, Twitter-storms and online shit-storms, "like"- and reality culture, cyber-bullying, popular political programs, science funding, etc.?
- What impact do opinion bubbles, polarization and lemming effects have on networks in which we interact and how may such bubbles be resolved in terms of formal modelling, experiment, simulation, mechanism design, policy recommendations and nudges?
- Are some agent types, or networks, less susceptible to unfortunate bubble based behavior than others, and if so, what are the informational conditions for “bubble immunity” in markets, from finance to overheated extremist polarization in matters of religion?

Answering such questions will extend the prevalent theories of bubbles and evaluate their explanatory power in other disparate settings. But bubbles may not necessarily be malignant if they mirror public conviction on correct information and social influence rails reason. Bubbles calling for crowd climate awareness, race and gender equality, health care, altruistic behavior etc. seem benign enough and thus bubbles may perhaps be used to promote good ideas and socially desired initiatives.

3. Bubble Hospitable Environments

Bubbles don't just appear out of the blue. They are cultivated in environments — *bubble-hospitable environments* in finance, in science, society and on social media. A central part of the Bubble Studies paradigm is to isolate the nuts and bolts of such environments, as they are methodologically pivotal to the success of this interdisciplinary research endeavor.

While scouting for such milieus one should look out for assorted additives, which when mixed just right, may make the prices at which an asset is traded part company from the fundamental value of asset. Now a social asset may be sympathy for a political stance, disgust towards a religious denomination, subscription to some cultural conviction, variegated social imprimatur, etc. It's been largely assumed that there is a fundamental value to an asset while defining bubbles. But on the current understanding the fundamental value is not a precondition as long as one may get other traders to believe that everybody else believes that whatever is being traded is worth something.

This is by way of example largely the case in cyber-social bubble economics (Hendricks 2014b) and the Lasnier situation where pluralistic ignorance carried the weight of trading social status. In turn, social psychology may be propelled to light speed online from pluralistic ignorance to jumping bandwagons on a global network.

Listing 3.1. Bubble Hospitable Environments

To be a spotter of bubble-hospitable environments, look out for:

1. **Assets** of interest; social capital, status, respect, sympathy, influence, power, stock, real estate …
2. Low or cost-neutral investment of **liquid means** in terms of "likes", upvotes, comments, selfies, emoticons, cash…
3. Political, institutional or commercial **initiatives** boosting liquid exuberance from "like"-farms to generous banks and mortgage brokers
4. Expectations of fast **return** of investment in terms of social capital, fame, respect, influence, encouragement, reputation, sympathy, money ...
5. Presence of **investors** (or traders) but also noise makers, trolls and other forms of market derailing expectant investors in the market place
6. Architectural **configuration** of the online aggregate platforms or social marketplaces facilitating individual investment, possible framing, and the detectable accumulation of liquid means around an asset
7. **Network** and "friendly" sorting of content or information
8. Algorithmic, or other deliberate, **sorting of content** of information
9. Elements of **social proof**; bandwagons, bystanders, cascades, altruistic punishment, conformity, ...
10. **Investor information** about other investors

A momentous part of the current information-driven models of bubble emergence in economics relates to what investors know, or do not know, believe or do not believe, about each other and the conditions of market. In particular (Abreu & Brunnermeier 2003, Brunnermeier 2008) isolate four main strands of bubble models including (i) models in which all investors have rational expectations and symmetric information (Blanchard & Watson 82) but bubbles appear all the same, (ii) models for which investors are asymmetrically informed as they all know that the asset is overheated, but it is not common knowledge that a bubble is in the works (Allen, Morris & Postelwaite 1993; Brunnermeier 13), (iii) models where bubbles persist due to limited arbitrage where rational and well-informed investors interact with noise traders psychologically biased in unfortunate ways (DeLong et al. 1990) and finally (iv) models of bubbles in which different investors hold different

beliefs about the fundamental value of the asset and agree to disagree accordingly (Harrison & Kreps 1978).

In all four model types, social information implicitly plays a key role among the investors when it comes to bubble formation. By way of example, an uncertain opinion investor who believes that everybody else believes in some political program, may be influenced by apparent social proof to believe in the very same program, even though, in fact, a very few actually find the political program appealing. Here the evil cousin of common knowledge – pluralistic ignorance – is in play once more as one of the climacteric stimulants of a political bubble (Hendricks & Rendsvig 2015).

Similarly, every opinion investor may very well know that the situation surrounding the killing of a giraffe in a Danish zoo is not really a question of animal molestation but about the configuration of the gene pool in European zoological gardens. While the individual opinion investor knows this it is not the case that every investor knows that every investor knows accordingly, thus it is not common knowledge among them. In this case, every investor may privately know that the problem pertains to the genetic incompatibility but simultaneously erroneously believe that everybody else believe that #marius the giraffe is about animal molestation. The lack of common knowledge can start Twitter-storms. Now, here is a whole research program in mapping the landscape of what opinion investors know, assume or believe about their own point of view and the view of others, e.g. social information, when it comes to bubble formation in science and society — analogue as well as digital.

4. Conglomerate Objects and Research Management

The object of inquiry – that is bubbles – in Bubble Studies is a conglomerate research object consisting of a spread of different disciplines properly aligned to each other and working in sync. A non-exhaustive catalogue of scientific fields making up the interdisciplinary research program which Bubble Studies is, includes in more or less arbitrary order:

- **Economics** — entities, vocabulary and formal models of bubble emergence in finance, lab models of bubbles and market types
- **Mathematics** (including game theory, decision theory) — the formal models of agent interaction, strategic reasoning, structure and dynamics of bubble formation
- **Social psychology and behavioral science** — social proof, socio-informational phenomena, collective reasoning and pitfalls, rational and irrational group patterns of behavior, experiments, nudging

- **Computer science and information theory** — network structures, information transmission, automated opinion aggregators and ranking systems, social media platform architectures, feed technology, search engine technology, simulation
- **Philosophy** — the epistemology of belief formation, revision, knowledge acquisition and maintenance, agency, rationality, trust, agreement, disagreement, the epistemic ballgame of deliberation, decision and action
- **History** — systematic historical studies of bubble phenomena from revolutions to the dot.com crisis based on the generic elements of bubble hospitable environments
- **Social science** — systematic studies of group agency, institutional design, sectorial configuration, societal organization, civil society, citizenship
- **Political science** — voting behavior, turnout, elections, referendums, public opinion, deliberative democracy, public consultation, political strategy

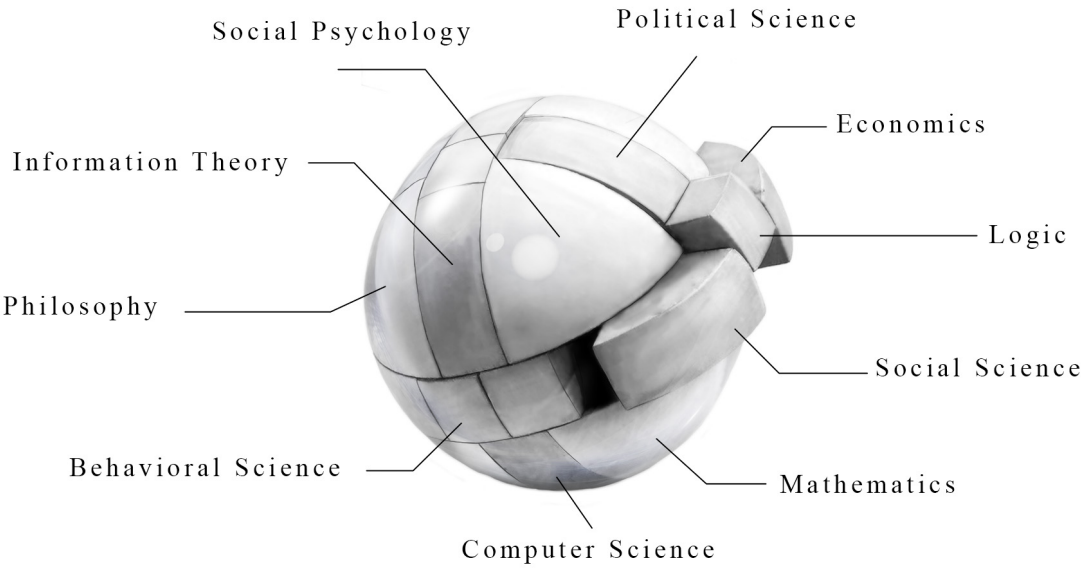

Figure 4.1. Bubbles as conglomerate research objects

An immediate research management challenge is the focal alignment or convergence of the disciplines on the unique conglomerate research substance. The disciplines are not to run in parallel with each other and alongside the bubble doohickey but to end up as converging lines with the

composite research object as the vanishing point factoring in everything from vocabulary to methodology, from social psychology to computer science. Isolating the generic elements of the bubble hospitable environments (Listing 3.1) will serve as the immediate platform for this interdisciplinary alignment. To further joint alignment and interdisciplinary convergence on the bubbly object of inquiry a set of adequate mappings is initially required from,

i. Assets / liquidity / returns / markets / agents (investors) / investment horizon in economics to assets / liquidity / returns / markets / agents (investors) / investment horizon on social media, in politics, reality culture, in the news and the press, health care and treatment and elsewhere where bubbles may emerge.

A noise trader in economics (Black 1985) may, given certain reasonable assumptions, be considered affine to a noisemaker (troll) in the blogosphere (Hendricks 2014d; Hendricks & Hansen 2015). Monetary return is well defined, it is less transparent what the return of an opinion investment online pertaining to the current refuge and migrant debate in Europe amounts to. Thus, such mappings are not always isomorphic but the lack of such isomorphisms, or inadequacy of postulated mappings, is a crucial methodological tool in the demarcation of bubble phenomena, avoiding confirmation bias and consequently not seeing bubbles everywhere. Domestic violence and the proliferation of a fashion trend like "skinny jeans" are not bubble phenomena even though there is a lot domestic violence and plenty of skinny jeans out there. Bubble Studies as a scientific composite should not end up a bubble itself (Hendricks & Hansen 2015).

Items like assets, liquidity, returns, agents etc. are largely generic ontological elements, while

ii. investor information about the elements of the markets, about each other, susceptibility to social proof, organization in network structures, bubble dynamics, intervention strategies are all epistemological features of the bubble hospitable environment, whereas

iii. formal modelling, constrained conceptual analysis, experimentation and simulation belong to the methodological toolbox of Bubble Studies.

Now for each bubble phenomenon, from Twitter-storms over opinion bubbles, political bubbles, status bubbles, consumer bubbles, news bubbles to bullying and science bubbles the content of (i)-(iii) have to be collected, clarified and checked out ontologically, epistemologically, methodologically. The results are

- Bubble Studies demarcation,
- disciplinary alignment,
- precise determination of the composite research object in some studied domain, and

- the rendering of cross-disciplinary results
    - from the structure and dynamics of various bubble phenomena to
    - intervention strategies for malignant bubbles and
    - stimulation proposals for possible benign bubbles

all in accordance with the bubble matrix depicted in Figure 4.2.[1] That's the brass tacks and business of Bubble Studies.

[1] Items (arbitrarily ordered) in the columns are possible placeholders for concepts listed in the heading - from Asset to Simulation - the content of which are dependent of the bubble phenomena under investigation which again are listed in the column on the extreme left – from opinion bubbles to #tag trends.

Figure 4.2. Bubble Matrix

Bubble Phenomenon	Asset	Liquidity	Return	Market Type	Time Horizon	Investor Information	Social Proof	Network Structure	Dynamics	Interv. Strategy	Malignant / Benign	Experiments	Simulation
Opinion bubbles	Stock, real estate …	Cash	Capital	Perfect competition	Instantly	Common knowledge	Bystander	Bus	Burst	?	Yes	Controlled	Python
Polarization bubbles	Reputation	Comments	Fame	Monopoly	Short	Common belief	Bandwagon	Star	Deflate	?	No	Natural	NetLogo
Political bubbles	Authority	Likes	Respect	Oligopoly	Intermed	Mutual knowledge	Cascades	Ring	Merge	?		Field	C++
Religious bubbles	Respect	Upvotes	Encouragement	Monopolistic competition	Long	Distributed knowledge	Herding	Mesh	…	?		Big Data	…
Stock bubbles	Anger	Downvotes	Advice	Contestable markets	None	Pluralistic Ignorance	Conformity	Tree		…		…	
Marketing campaigns	Anxiety	Shares	Funding	…	…	Noise traders	Polarization	Hybrid					
News bubbles	Insult	(Re-)Tweets	Assistance			(A-)Sym. inf.	Cognitive bias	Daisy Chain					
Consumer bubbles	Awe	Selfies	Sympathy			…	Altruistic punishment	Point to Point					
Status bubbles	Influence	Friends	Empathy				Copying bias	Fully connected					
Social bubbles	Power	Emoticons	Status				Attitude consistency	Partially connected					
Science bubbles	…	…	Influence				Attitude strength	…					
Filter bubbles			Disgust				Spiral of silence						
Bullying bubbles			Hate										
Conviction peaks			Power										
Threads			….										
Twitterstorms													
Shitstorms													
#tags													
...													

5 Science Policy and Investment Portfolios

The study of bubbles and related information distortion phenomena is the study of a central and important human structure. It's a thoroughly interdisciplinary enterprise involving psychologists, behavioral scientists, philosophers, historians as well as economists, mathematicians, engineers and computer scientists. Preventing malignant bubble effects will be one of the severe challenges of the information age, and it should play an important role in the humanities.

Taking science itself as the object, ask: What does the growing insight in bubble phenomena reveal about science policy — the humanities in particular? The more general and less theoretically refined a scientific claim is, the harder it is to falsify — potentially making parts of science rely on such immunizing features in bubble-hospitable environments. Perhaps the current fad of attempting to coach scientific applications into immediate usability by the prioritizing of “Interdisciplinarity”, "Grand Challenges" etc. adds to such effects — making it potentially worthwhile for even very remote corners of the research world to try and recast their research in such terms. By way of example, every research proposal is not interdisciplinary just because it may inform other sciences. If the object of inquiry is not an interdisciplinary composed whatchamacallit saying – even emphatically – that it is, doesn't make it so.

Science, like any other field that attracts investment, is prone to bubbles. Overly optimistic investments in scientific fields, research methods and technologies generate episodes comparable to those experienced by financial markets prior to crashing. Assessing the toxic intellectual debt that builds up when too much liquidity is concentrated on too few assets is an important task if research funders want to avoid going short on overvalued research. Neuroscience may be the next big science bubble; in the humanities, suffice it to mention fashionable waves such as Marxism, postmodernism, radical social constructivism with too ambitious explanatory expectations — much like in neuroscience (Budtz Pedersen & Hendricks 2013).

What should science policy learn from the diagnosis of such science bubbles? One idea may be to try to institutionalize pluralism in the science support and funding systems. Not only in the elementary sense of giving the possibility of plural investigations of yet-unknown answers from different viewpoints, but also in the sense that a plurality of different, independent support systems and modi may be preferable. This may go against basic administrative simplicity, preferring rationalization in the sense of fusing a plurality of different subsystems into easily controllable, larger wholes. A plurality of different funding agency composed in different ways should be

combined with a differentiated range of funding formats – including small – and medium-scale group applications for initial investigations, which may or may not later evolve into larger programs. No guarantee is issued preventing the appearance of science bubbles, but the existence of science bubbles should be taken into consideration in science policy so as to attempt to create an environment for the development of sciences, which is not bubble-hospitable. A smart portfolio manager will always tell you to secure diversification in your investment portfolio in order to spread out the risk and avoid frenzies, manias and bubbles — the same may be the case for science funding.

6. While at it: Humanities on the Offense

Homo sapiens as a species is approximately 200.000 years old. The behavioural characteristics that humans are known by today date back about 50.000 years. Now, compared to the age of the universe we're clearly infants. Compared to, say, the advent of the Internet recently celebrating its 40th birthday, we're pretty old. Compared to the birth of social media, we're definitely quite experienced as to human interactions, expressions and relations. Homo sapiens have even come up with a discipline designed to describe, analyze and account for this experience — it's called the *Humanities*. And in the age of information, Humanities has a whole new target package and a second life to go with it.

Humanities is the study of the human condition, interaction, expression, and relation to nature, technology, health, art, politics, religion, … money, matter and mystery. Now, the Internet is really an online cultural treasure chest and a constantly updated repository of such human interactions, expressions and conditions – for better and for worse – and they are all on file, searchable by a myriad of web search engines, network analyzers, crowd opinion aggregators and the list goes on.

Leopold von Ranke (1775-1886), a German historian and the pioneer of the modern source-based history with a profound influence on Western historiography could not have asked for better conditions for conducting studies of the human condition. But von Ranke in his search for objectivity in historiography, would, most likely, also be apprehensive pertaining to the ease by which information may be obtained for deliberation, decision and action in the information age. Not all information is good information, indeed information may, if not properly acquired, formatted, handled and administered derail reason and rationality, lead to unfortunate bubble formation in science and society at large and even threaten democracy (Hendricks 2014f). Years down line from von Ranke, Mitchell Kapor, the founder of Lotus Development Corporation, one of the most

successful companies back in the early days of personal computers, also warned against the pitfalls of information in abundance, infostorms and the uncritical usage thereof, as he is reported to have proclaimed: "Getting information off the Internet is like taking a drink from a fire hydrant." In the same vein, Jeffrey Klintrop, *LPL Financial* Corp.'s chief market strategist recently said: "If something is going on, Twitter is the place to go to get the fastest information (…) It's gonna get there first and it might not be the full story. That is where you have to wait for other established news sources to comment and do legwork on your own." [2]

The "legwork" that Jeffrey Kleintrop is referring to is much of what von Ranke instigated by his search for objectivity including source-based information rather than hearsay, reflective criticism, multiple source triangulation and many of the other methods of scientific inquiry taught in the Humanities today. Thus the common practices of the Humanities to secure qualified deliberation, decision and action is already in use out there as we face these tasks every day across the board from economic decisions to what school to choose for our children.

But there is simultaneously a narrative out there which has been growing robust for a number of years; the Humanities is in decline, there are no or only very limited job opportunities for majors in the Humanities, majors in the Humanities are often societal burdens because of unemployment and prospects of low tax revenues and the *Daily Beast* recently declared History, Philosophy and English some of the most useless majors of 2012.[3] Proponents of the value of Humanities often point to successful business stories, innovators, incubators, instigators and luminaries with a background in these "useless" fields, argue for the value of Humanities for cross cultural understanding in a global world, analytic skill sets, critical thinking and deliberative diligence, preservation of cultural or intellectual heritage and other academic virtues of a classical education and sometimes re-frame the apparently unimpressive unemployment numbers not to look so grim.

These moves read as defensive tactics, rather than offensively setting the new standards for, and second life of, the Humanities in the information age. Frankly coming from the Humanities we don't want to be seen as the quarterbacks of scientific practice but want to be on the offense scoring touchdowns, generating results and setting the agenda for where to go from here.

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[2] http://www.newsleader.com/usatoday/article/2106985, accessed September 22, 2015.

[3] http://www.thedailybeast.com/galleries/2012/04/23/the-13-most-useless-majors-from-philosophy-to-journalism.html#endSlide, accessed September 22, 2015.

There is new territory here to conquer, analyze and understand for the Humanities. Here is a target package from the abyss of new challenges in the age of information technology and social media:

1. Outsourcing human interaction and communication to technology as Selinger recently noted pertaining to a new app: "BroApp, a "clever relationship wingman" (their words) that sends "automated daily text messages" to your significant other.[4] It offers the promise of "maximizing" romantic connection through "seamless relationship outsourcing." What's this and other similar automated initiatives going to mean for the human condition?
2. The advent of "social physics" as a new theory of social interaction based on network analyses which spills over into organizational management, urban planning, and digital privacy among other things (Pentland 2014)
3. The faith and nature of transparency, security, revolution, change, democratization of information, freedom, equality, enlightenment, knowledge, method, power, sense, sensibility, sentiment and all the other central notions of (digital) Humanities and Big Data.
4. Bubble formation and infostorms from finance to status economics, opinions, fashion, science, and art and the discontinuity between saying something online and doing something for real, combined with the role of online gestures as opposed to real-life communication and conversation.
5. … and the list goes on

What is it Al Pacino says in *Scent of a Woman*? "I'm just getting warmed up!" Indeed, the Humanities are just getting warmed up for a 2nd life and we are all in it - from natural science, technology to social science and essentially interdisciplinary humanities.

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[4] http://www.wired.com/2014/02/outsourcing-humanity-apps/, accessed September 23, 2015.

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