# Abstract/Synopsis

We argue that the aim of many literature reviews is to be *efficiently informed*, and that this aim is distinct from the attempt to *comprehensively (dis)confirm* any particular hypothesis: the main aim of many systematic reviews and meta-analyses within clinical research. It is important to recognise the difference between these two aims, as attempting to efficiently inform ourselves by adopting methodologies framed around the latter paradigm can be counter-productive. In order to become efficiently informed through a literature review, it is important to think carefully both about the concept of efficiency, and of information. Efficiency implies a conversion factor, between some input, and some output. The input is time, our time as researchers, and the output is information.

Information is multi-faceted. Pragmatically, we suggest there are two fundamentally different kinds of information that, as researchers, we should seek from literature: a qualitative or categorical kind, which proffers a particular stance with which data, broadly defined, can be interpreted; and a quantitative or calibrative kind, of information-as-evidence, through which degrees of belief about different categorical stances are modified.

The notion of efficiency also evokes the concept of return-on-investment, and for this reason we adopt and co-opt a concept from financial investment: the Barbell Strategy. The Barbell Strategy, discussed extensively by heterodox financier and philosopher Nasim Taleb within his book Antifragile, asks us to imagine a search space with two dimensions: one demarcating the probability of a successful outcome, and the other demarcating the expected return should an outcome be successful. The Barbell Strategy suggests that an efficient and stable long term strategy is to sample from two opposing corners of this search space: the corner in which success probabilities are high, but the expectations are low; and the corner in which success is unlikely, but the expectations are high. The archetypal examples of the first corner are government bonds, and of the second corner are shares in start-up companies.

In this paper we use the Barbell Strategy to structure our review of the literature on segregation, as it applies to social groups and urban form. Our ‘stocks’ include: reviews of key papers already known to us, and papers citing these papers; a comprehensive review of references returned from a highly targeted search query; and a review of papers in a key journal in our field, Environment & Planning A. Our ‘shares’ include an intentionally patchy and partial sampling of references returned from a much broader search query.

We find XXXX.

We conclude XXXX.

# Introduction

...

## Comprehensiveness and Efficiency

...

## The dual forms of information

A danger of the …

## Categorical information

The clearest and most powerful way of introducing categorical thinking is with reference to the famous ‘Dalmatian’ image from gestalt psychology. The image is simply a matrix of pixels, some white and some black. To the uninitiated, this is exactly as it appears: a disorderly, Pollockesque mess of splotches and smears. To the initiated, however, the image becomes of something, a Dalmatian dog sniffing the ground, perhaps in a woodlands area.



The act of initiation, the establishment of a gestalt interpretation of the matrix of data, occurs because the viewer has a new categorical stance with which this data can be interpreted. This categorical stance is informative as it brings meaning and coherence to that which is being observed. The identification of new categorical stances, new frameworks of interpretation, new lenses with which to see the world, represents one of the two forms of information which, as researchers, we seek to gain from undertaking a literature review.

Psychological research has suggested that some conceptual stances come to us more easily than others. This includes a propensity to see faces in clouds, saints and deities in burnt toast, and to hear the bizarre word salad of the deceased in white noise. There may be evolutionary reasons for such a configuration of pre-loaded conceptual stances, although evolutionary psychology is itself an example of a conceptual stance whose standing varies between research communities, and so is offered here as a suggestion rather than an assertion.

Conceptual stances help to order and frame the world, for good or ill. The interpretation of and distinction between different colours is a case in point, being the human perception of different frequencies within a narrow band of electromagnetic radiation. Colour perception is a research domain in which the tectonic plates of physiology crash powerfully against those of linguistics and sociology: although the cone cells within the human eye provide some fundamental limits on those bundles of waves we perceive and colourful, and those that we do not, the mapping of bands of light to specific colour terms varies between cultures and languages. Different cultures cut the spectrum in different places, and these boundaries shape the perception of similarity and difference: research into this domain typically involves asking people to compare pairs of visible light waves, and to judge whether the colours in the first pair are more similar or more different from each other than the colours in the second pair. Pairs of light waves a fixed frequency apart were perceived as more similar when they both fit within the same colour boundary category defined by the viewer’s language (e.g. “two shades of red”), but as more different when each occupied a different colour category (e.g. “a reddy orange and an orangey red”).

Conceptual stances and category thinking therefore distorts as it sorts, expanding subjective distance in some instances while compressing it in others. To repeat the adage, to someone with a hammer everything looks like a nail. However, there is no escape from subjectivity, no value free and objective position from which we can view the world clearly and without distortion.

The solution to the subjectivity of any particular conceptual stance is not to abandon it for a view from nowhere, but to augment it with additional perspectives, stances and interpretative frameworks. As with the Dalmation image above, finding the right stance can lead to a wholesale transformation in how something is understood; once seen, never unseen. More often, however, no one stance is dominant, and instead a finite range of stances each appear plausible, reasonable, believable.

We argue that conceptual stances represent a vitally important kind of information, and that the identification of novel stances should be explicitly recognised as one of the two kinds of information that a literature review should aim to identify.

[Other examples]

[CHO PHO USE]

[PINKER AND INDIRECT SPEECH]

[JANE AUSTEN & GAME THEORY]

## Calibrative information

The second kind of information that we seek to gain from a literature review is to do with the calibration of preferences or beliefs. This is the kind of information towards which systematic reviews are targeted, with the targeting becoming most focused when the outputs from such review form the inputs to quantitative meta-analyses. However, calibrative information is not inherently quantitative, as the term is usually applied within the social sciences, even though the spatial numeric concepts of sliding scales and amounts are intrinsic to the psychological mechanisms at play. Whenever someone reads a newspaper, their beliefs change, if only by a small amount. Put differently, the information contained in the news source alters the strength of preference that the reader has towards each of a range of categorical stances. After reading something, some things become easier to believe, and others become harder to believe. Preferences towards different categorical stances move up or down according to the information available.

This basic idea is at the core of statistical inference, uniting both frequentist and Bayesian schools of thought, though is conceptually closer to the latter school.[[1]](#footnote-1) Data updates beliefs, where beliefs in statistical inference represent the likelihood of different models and model parameters given the data that have been observed. However, the process and standards for choosing between models say nothing about where the models came from in the first place, and why some models make the cut, and are considered for formal comparison using statistical tests like F-tests and the Akaike information criterion (AIC), whereas others are not. As a simple example of this, the modeller may entertain the possibility that gender affects health, but not that health affects gender, even though both models are as easy to express algebraically. These models are formalised and stylised statistical articulations of the modeller’s interpretative frameworks, and these frameworks are identified through processes that are essentially informal and vague, and cannot be subcontracted to a computer-based algorithm.

Although the process of calibrating beliefs is easier to describe and more consistent when outsourced to a statistical algorithm, the principle is fundamentally neither ‘quantitative’ nor ‘qualitative’, and instead forms an epistemic thread that binds together all forms of social enquiry.

## Two kinds information: trade offs

We have suggested in this discussion that both kinds of information represent important quarry for a literature review. Further, we suggest that a literature review that focuses only on identifying one of the two kinds of information is usually likely to represent a less efficient use of the researchers’ time than a review in which both are considered priorities. Lopsidedness balanced towards the first kind of information is likely to be all talk and no action: the curation of a set of tools, but only exhibited for display purposes rather than used in practice. Similarly, lopsidedness towards the second kind of information – perhaps a more common scenario – can be an effective recipe for collective ignorance and phenomenological blindness. Within psychology, it can lead to phenomena such as attentional blindness, in which viewers told to count the number of passes of a ball between a group of students, wearing one of two team colours, become so focused on this cognitively demanding task that they did not spot someone slowly walking into the middle of the frame dressed as a gorilla. The instructions provided to the viewers primed them towards a particular conceptual stance, in which ball passes and team colours are what matters, and all else becomes unobserved.

The need to avoid information lopsidedness resonates with the warnings made by C Wright Mills, in The Sociological Imagination, that social scientists should seek to travel a middle ground between grand theory and abstracted empiricism.

## Journals as information pools

An important complication when pursuing the information-as-resource analogy is that academic publications are the product of social networks: groups of peers with similar interests and expertise, and so holding similar stores of both kinds of information. Peer reviewed journals, specific to a particular field or discipline, encourage the sharing of both categorical and calibrative information within. A focus on transferring information with peers necessarily means paying less attention to what is shared in other disciplines. Academia, in its normal mode, encourages specialisation and even speciation, leading to the channels of information transfer between disciplines becoming narrower and shallower as those within become wider and deeper.

If the goal of a literature review is to learn to swim best with the currents of one’s own discipline, then developing deep familiarity with such literature is vitally important. However, if as we suggest the goal is to be efficiently informed, then thinking about disciplines as information pools suggests a more mixed strategy can be most effective. Categorical stances may be recycled, cleaned of their original context, stripped of their specifics, and applied elsewhere. Anyone who uses statistical regression to research something other than eugenics, or anyone who has ever used a metaphor, already knows this implicitly. The worst that can happen is nothing. The next worst that can happen is that the migrant stance is introduced, found to be a poor fit in its new intellectual habitat, and disappears. The best that could happen, however, is that the new stance fits brilliantly, transforming myriad messes and splotches into spotty dogs and other animals, and so the field gains a new information ecology. Thomas Kuhn’s term ‘paradigm shift’, once dug out from the layers of cliché and jargonese that buried it over the last half century, is fundamentally a description of the effect that a new, or even just newly applied, conceptual stance can have on scientific enquiry.

Within this discussion we have focused in this discussion on how other academic pools as a valuable source of categorical information. However, it should also be mentioned that these sources could also be useful sources of calibrative information as well. For example, in order to understand many social processes, operating at a middle range of time and space, it can be useful to look also at data from those disciplines with lenses focused on phenomena at an order of magnitude above and below. For example, an understanding of racial prejudice observed at the sociological scale can be both supported by psychological and neurological research about how social categories are generated and responded to within the brain; and lifted by an awareness of findings from physical geography and agriculture, showing differences in the yield and nutritional quality of the crops that grow in different parts of the world, and the differential availability and accessibility of other forms of natural resource.

Because of the potential benefits of long distance trading of information, looking widely should be encouraged. Because individual academic fields tend to echo and refine the same core stances, the time that needs to be invested in order to learn at least the genus of the concepts that swim in other pools does not have to be onerous. The most informative and important stances native to a particular discipline are also likely to be the largest, loudest and easiest to spot. This insight will shape how we go about performing the High Risk/High Expectation segment of the Barbell Review strategy, described later.

## Systematic Reviews and Meta-Analyses

Systematic reviews, of the type developed in the medical sciences by Cochrane and colleagues, and which form the bedrock of the evidence-based medicine movement over the last half century, are a resource intensive activity. Because of the desire both to be comprehensive and to be unbiased, reviewers spend many months reviewing hundreds of thousands of papers. By design, throughout the process the conceptual stance is held constant; all papers are viewed from the same lens, and judged equally in terms of their calibrative information potential. The trade-offs of the rigour of the systematic review process are rigidity, inefficiency, and resource-intensiveness. Systematic reviews and meta-analyses have rules in place which help prevent researchers from gaming or biasing results - from peeking under the hood and choosing a primary outcome on the basis of effect size, for instance – but because of this they can also prevent categorical information gained, after the focus was set, from being acted upon until after the review process has been completed.

Systematic reviews and meta-analyses are excellent tools of enquiry, but only when the shape and structure of the answer is known, and can be defined clearly in terms of patient groups, substantial and measurable outcomes, valid and unambiguous comparators, and study design (the PICOS framework). The systematic review and meta-analysis framework is also highly effective when agents begin with different perspectives of ‘what works’, but agree about the methods and criteria by which such disagreements can be resolved. The process is a trial between mutually exclusive beliefs, null and alternative hypotheses, and requires that both prosecution and defence agree that the court, the judge and the jury constitute a legitimate form of objectivity and authority.

However often social researchers, as well as clinical researchers, begin without this clarity of structure. Likewise, social agents with different beliefs often have different meta-beliefs too: different beliefs about what is needed to change a belief.

## Taming versus riding risk: The Barbell Strategy

A clear narrative has emerged in recent years about the reason for the recent financial crisis of 2007-8. Much of this narrative has focused on a culture of untrammelled greed within financial institutions, in which long-standing instincts towards material accumulation were incrementally freed from both the structural restrain of government regulation, and the cultural restraint a feeling of embarrassment or shame at receiving remuneration, for trading commodified abstractions, orders of magnitude greater than any key worker whose activities are clearly and demonstrably socially useful. A substory within this narrative was a sense of technocratic hubris, in which it was felt that technical solutions had been found to epistemological problems, and that by feeding numbers into formulae like the Black-Scholes model, risk could be tamed, solved using numerical optimisation routines, and as a result deep leveraging, betting the bank on a future predicted by an algorithm, was not only safe but necessary to avoid falling behind global competitors.

The problem was that the taming of risk was an illusion, a distortion of reality caused by said formulae making the assumption that uncertainty and variability is like error, and can be represented by a Normal distribution; looked at through this lens, the future looked narrower, safer, and easier to operate. A sense of mastery – of ‘the universe’ – thus emerged, and fearless hubris followed. According to Taleb, the Financial Industry fell for a variation of the *ludic fallacy*, in which an over-reliance on standard quantitative methods caused reality to appear like the games of chance, such as cards or dice, on which the theories of probability underlying most statistical models are based. Such models begin to imagine chance to be tame, future events played out according to invariant rules, populated by unknown constants just waiting to be discovered. Viewed from this conceptual stance, the estimation of a model parameter becomes equated with the identification of fundamental rules and numbers that govern the logic of life (or at least, those components of it that have been or can be monetorised).

Taleb’s technical criticism of these models, implicit the titles of his two books *Fooled by Randomness* and *The Black Swan*, was that ‘thin-tailed’ (Gaussian) rather than ‘fat-tailed (power law) probability distributions had been applied. These thin-tailed distributions suggested to users that certain events are so rare as to be effectively impossible, and therefore that they never have to be prepared for. As a result, when reality broke the rules of the game, and started to do a series of ‘impossible’ things, institutions whose behaviour had been guided by these models saw equity magically transform itself into debt, and profit into loss.

Taleb’s solution, to the dangers of peering too deeply through the ludic lens, is to accept risk as something that is fundamentally wild rather than tame, and adopt an investment strategy in which ‘good’ wildness, the unexpected ‘upside’, can be made use of, but ‘bad’ wildness, the unexpected ‘downside’, can be survived. The Barbell Strategy is Taleb’s proposed approach for investment in a world in which risk cannot be tamed, but can be ridden.

The Barbell Strategy, as summarised in the abstract, asks us to imagine a search space with two dimensions: one demarcating the probability of a successful outcome, and the other demarcating the expected return should an outcome be successful. The Barbell Strategy suggests that an efficient and stable long term strategy is to sample from two opposing corners of this search space: the corner in which success probabilities are high, but the expectations are low; and the corner in which success is unlikely, but the expectations are high. The archetypal examples of the first corner are government bonds, and of the second corner are shares in start-up companies.

Given our representation earlier of disciplines as information pools, and of the potential benefits of transformative change that can occur as a result of successfully migrating a conceptual stance, we suggest that searching broadly can constitute the high risk/high expectation component of the strategy, just as searching areas already known to contain relevant material can constitute the low risk and low expectation component of the strategy. The sections below describe our operationalisation of these two strategies.

## Strategy for Stocks (Low Risk / Low Expectation)

...

## Strategy for Shares (High Risk/ High Expectation)

...

1. Within both schools, there is exists both information of the first kind and information of the second kind. The information of the first kind comprises both the model in its totality and each of its constituent parameters; the information of the second kind comprises the data. Both frequentist and Bayesian schools apply Bayes’ Rule and consider the estimation of model parameters to be an inverse probability problem: what a model with a particular set of parameter values can show is the probability of the data given the model; what is of interest to statisticians, however, is the probability of the model given the data. Both frequentist and Bayesian schools settle on the concept of likelihood, stating that the likelihood of the model given the data is proportional to the probability of the data being observed given the data. The schools differ in the interpretation and valuation of P(theta)/P(data), which in the Bayesian framework is interpreted as the prior. In the frequentist interpretation this function is in effect set to ‘1’ for convenience, which from a Bayesian perspective is considered an improper prior. [↑](#footnote-ref-1)