# Co-Experience and the Legibility of Contribution

## A Preliminary Discussion of Evaluation by Non-Participants

Wanhong Huang

**Abstract**

Contributions that sustain households, workplaces, communities and research fields are routinely absent from the records by which those same formations are assessed. The standard explanations locate the absence in power, in exclusion, or in the cost of observation. This paper proposes a different mechanism and argues that it operates prior to all three. Value of the generative kind, which consists in what a relation makes possible for its participants, is carried by evidence available only from inside the relation; value of the allocative kind, which consists in stocks already held, is carried by evidence available at a distance. An evaluator positioned outside a relation therefore faces an evidence set that is not merely smaller but systematically biased in kind, and the bias survives complete good faith, unlimited recording capacity and equal access. The paper states this as a legibility asymmetry, gives it a minimal order-theoretic carrier, and verifies the resulting monotonicity by simulation. Three consequences follow. The familiar appeal to coarse-graining explains less than it appears to, since universality arguments support the evaluator and not the objection to him. The appeal to scarcity is misplaced, since a resource constraint fixes a budget and never fixes what the budget is spent on. And the case for retaining fine-grained material rests on option value under irreversibility, which requires no prediction and no moral premise. The account is offered as a diagnosis with a determinate mechanism, and it declines to supply either a criterion of justice or a design for the infrastructure its diagnosis would recommend.

**Keywords.** generative value; allocative value; legibility; invisible work; coarse-graining; option value

**Draft.** This is a working draft. It is circulated for comment, and its arguments, formulations, and open questions are subject to revision. Correction and criticism are welcome at huangwanhong@serendip.ngo.

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## 1 Introduction

A household is sustained by care that appears in none of the accounts by which households are compared. A workplace functions through adjustments that its performance records cannot register. A research field advances through review, correction, translation and maintenance that its bibliometric representation omits. The observation is old, and it has been made carefully and often. What remains open is the mechanism. If the contributions are real, if the parties reporting them are sincere, and if recording them has become cheap, the persistence of the omission calls for an explanation that survives all three conditions.

This paper proposes such a mechanism. The proposal turns on a distinction between two modes in which a party may hold value, together with a claim about the evidence each mode makes available. A party holds value *allocatively* when the value consists in stocks already accumulated: income, credentials, titles, equipment, publications, property. A party holds value *generatively* when the value consists in what a relation containing that party makes possible for its participants: the capability a colleague raises, the steadiness a partner supplies, the trust a neighbour maintains, the corrections a reviewer produces. The distinction is familiar in outline. The claim developed here concerns its evidential consequences. Allocative holdings are carried by indicators that survive transmission to a party who has never entered the relation. Generative holdings are carried by indicators that are produced within the relation and degrade sharply as the observer moves outside it.

From these two premises a structural result follows. An evaluator positioned outside a relation receives an evidence set that is not merely smaller than the evidence available inside it. The set is biased in kind. Whatever the evaluator's diligence, budget or good will, the material that reaches the evaluator is disproportionately allocative, and the disproportion widens as the distance between evaluator and relation grows. Evaluation conducted from outside therefore favours allocative value systematically, and it does so under conditions of complete sincerity, unlimited recording capacity and equal access. This paper calls the result a *legibility asymmetry*, states it as a proposition over a minimal order-theoretic carrier, and verifies the associated monotonicity by simulation.

Three consequences give the result its interest. The first concerns the familiar appeal to scale. It is often said that the ordinary contribution disappears because large systems must aggregate, and that aggregation loses detail. The appeal is weaker than it appears. Taken seriously, the theory of coarse-graining supports the evaluator: universality arguments establish precisely that microscopic detail is irrelevant to macroscopic observables, so a party who invokes coarse-graining to explain the omission has invoked a body of theory which holds that the omitted material does not matter. The legibility asymmetry supplies what coarse-graining alone lacks, since it identifies a loss that is selective in kind, which no argument from aggregation delivers.

The second concerns scarcity. The standing objection to any proposal for finer repre-

sentation is that attention, administration and memory are limited. The objection is sound and it is misapplied. A resource constraint fixes a budget; it never fixes what the budget is spent on. Framed in the vocabulary of rate–distortion theory, scarcity determines the rate and leaves the distortion measure entirely open, and the distortion measure is where the selection between allocative and generative material is made. The objection from scarcity therefore leaves the substantive question untouched.

The third concerns justification. A recommendation to retain material whose future use cannot be specified appears to require a prediction, and predictions about open social systems are unavailable. The recommendation can be grounded without one. Where a loss is irreversible and where learning is expected, preserving the capacity to recover fine-grained material carries positive option value on standard arguments, with no appeal to a moral premise and no claim about which particular contribution will later matter. The justification is therefore available to a reader who rejects every normative commitment in this paper.

Two limits are fixed at the outset and observed throughout. This paper supplies a diagnosis and declines to supply a criterion of justice. Whether a given instance of illegibility wrongs anyone is a question about the conditions under which representational loss becomes injustice, and that question is treated in a companion paper. This paper also declines to design the infrastructure its diagnosis would recommend. The design problem depends on technical, legal and institutional conditions that are presently unavailable, and a proposal offered in advance of those conditions would describe a hope in the grammar of a solution.

The argument proceeds in five parts. Part I fixes the object and the restrictions on it (§2) and states the prior formulations of the phenomenon together with what each of them settles and leaves open (§3). Part II distinguishes the two modes of value and their evidence (§4), states the observation condition on generative value (§5), proves the legibility asymmetry (§6), and reports its verification (§7). Part III treats the appeal to scale (§8), the appeal to scarcity (§9), and the justification from option value (§10). Part IV applies the result at four sites. Part V records what the account declines (§12) and states its limits (§13).

## Part I

## The Problem of Illegible Contribution

### 2 Scope of the Account and Restrictions Placed on It

This section fixes what the paper is about. It states the object and the four restrictions that bound it, records the results imported from companion work, describes how case material is used and the disciplines observed in using it, and lists in advance the positions the paper declines to take. The purpose of stating the declinations early is to let a reader see the size of the claim before the argument that supports it.

### *2.1 The object of the account and its four restrictions*

The object is the relation between an evaluator's position and the kind of evidence available to that evaluator. Four restrictions bound it.

The first restriction is to *evaluation of parties by other parties*. The account concerns situations in which one party forms an assessment of what another party contributes, holds or is worth to some formation. Self-assessment lies outside it, as does assessment of objects that stand in no relation to the assessor.

The second restriction is to *position*, understood as participation in the relation being assessed. The account distinguishes evaluators who participate in a relation from evaluators who stand outside it, and it treats intermediate degrees of participation as lying on a continuum between those poles. Position in this sense is separate from authority, expertise, interest and sincerity, each of which varies independently of it.

The third restriction is to *contribution*, in place of welfare, desert or entitlement. The account concerns what a party supplies to a formation and the evidence by which that supply becomes available to an assessor. Whether a contribution merits reward, and on what principle, lies outside it.

The fourth restriction is *diagnostic*. The account states a mechanism and its consequences. It stops short of the normative question of when the resulting loss constitutes a wrong, and it stops short of institutional design.

### *2.2 Results imported from companion work and the terms on which they are used*

Four results are imported and used without re-argument.

From the treatment of generative and allocative modes in generative relational economics, the paper takes the distinction between value already held and value made possible through relation, together with the position that the two are separate modes of holding and no ordering between them is asserted.

From the work of Eglash and the Center for Generative Justice, the paper takes the central structural idea on which everything here rests: that the fate of generated value turns on whether it returns to those who generate it, and that alienation is the appropriate diagnostic for its failure to return [Eglash (2016)]. The debt is substantial and is acknowledged here in the framing and again in §3. The present paper works one layer earlier than that programme. Eglash asks whether generated value returns; this paper asks under what conditions its generation is observable at all, since a contribution invisible to the parties who allocate cannot enter the circuit whose closure Eglash's criterion concerns.

From the analysis of interpretive authority in the companion work on organisational rule interpretation, the paper takes the position that the party holding authority over an interpretation is generally distinct from the party the interpretation concerns.

From the analysis of relational grammar, the paper takes the position that asymmetry between parties generates power and that generativity absorbs it, together with the consequence that absorption capacity varies independently of formal access.

### 2.3 *Case material and the disciplines observed in its use*

Case material enters at four sites in Part IV: household evaluation of a prospective member, ordinary workplace contribution, academic evaluation, and public measurement regimes. The sites are selected because they differ in the dimension the account treats, which is the position of the evaluator, while resembling one another in the features that would otherwise explain the phenomenon. In each, the evaluator is sincere, the contribution is real, and recording is inexpensive.

Three disciplines are observed. Cases are organised by mechanism and never by domain, so that a reader can see which feature is doing the work. Named organisations and named persons appear only where a cited source names them. And constructed cases are marked as constructed at the point of use, so that no illustrative example is mistaken for evidence.

One further discipline concerns the author's own history. The origin of the framework within which this paper sits lies in a sequence of personal decisions whose outcomes were favourable. Such a sequence confirms a thesis about generative trajectories only because it succeeded, and the population of unsuccessful trajectories is invisible by the same mechanism the paper describes. Autobiographical material is therefore used to state a problem and never to support a claim, and §13 records the point as a standing limit.

### 2.4 *Positions declined in advance*

Four positions are declined, and the declinations hold throughout.

The paper asserts *no ranking between the two modes of value*. Allocative evaluation is appropriate to a wide class of problems, and the account gives a reconstruction of why parties adopt it that treats them as reasoning well under their conditions.

The paper asserts *no criterion of justice*. The legibility asymmetry establishes that an evaluative regime loses a determinate kind of material. Whether a given loss wrongs anyone requires a further argument, which is given elsewhere.

The paper asserts *no quantity to be maximised*. In particular it recommends no maximisation of visibility, no maximisation of recorded contribution and no maximisation of generativity. The reasons are given at §12, and they are reasons of principle: an objective function over these quantities would license trades across persons, which the framework within which this paper sits forbids.

The paper asserts *no design*. It identifies a class of infrastructure that its diagnosis would recommend and states why the specification of such infrastructure is unavailable under present conditions.

## 3 Prior Formulations of Illegible Contribution

This section states the formulations already available for the phenomenon this paper treats, and fixes for each what it settles and what it leaves open. The method is concession first:

each formulation is stated in terms its authors would accept before any differentiation is attempted, and the differentiation is confined to what the present account can establish. Where a formulation already contains the claim developed here, that is recorded and the claim is not asserted again. The section closes with a statement of the residue, which is the portion of the phenomenon that no located formulation settles.

### *3.1 The ecology of visible and invisible work in Star and Strauss*

Star and Strauss state the closest available version of the thesis [Star & Strauss (1999)]. Their opening position is that no work is inherently visible or invisible, and that work is seen through a selection of indicators, which may be strained muscles, a finished artefact or a changed state of affairs. The indicators shift with context, and the relation between visible and invisible work is settled by negotiation over them. They describe the disembedding of background work, the production of a non-person in domestic service, and the movement of work backstage, and they note that as industrial practice changes the inference from indicator to work grows longer and may become wholly abstract.

The concession is complete. The selection-of-indicators thesis is the general form of what this paper argues, the lengthening of the inference chain is the phenomenon §5 analyses, and the ecological framing is compatible throughout.

The differentiation is narrow and concerns the status of the selection. Star and Strauss treat the set of available indicators as settled by negotiation, so that a different negotiation would make different work visible. The present account holds that for one class of value the distal indicator is unavailable independently of any negotiation, since what would have to be transmitted is a change in what a relation makes possible for its participants, and the parties positioned to register that change are the participants. A negotiation may alter which of the available indicators are attended to; it does not supply an indicator that the evidence structure withholds. The difference matters for remedy: on the negotiated reading, the appropriate response is a renegotiation, while on the present reading a renegotiation conducted among non-participants cannot reach the material at issue.

### *3.2 Generative justice and the circulation of unalienated value*

Eglash's generative justice [Eglash (2016)] supplies the framework within which this paper works. Its central proposal is that the destructive force Marx [Marx (1975)] located in capitalism has its root in the alienation of value from those who generate it, that the analysis extends beyond labour value to ecological and expressive value, and that the bottom-up formations of the last decades, peer production and community agroecology among them, restore circulation of unalienated value where top-down economic governance did not. The programme is stated in terms of self-generative cycles through which value returns to its generators, and the diagnosis of failure is extraction, which converts a circuit into a one-directional flow.

The concession here is more than a courtesy, since the account also contains the invisibility observation. Eglash records that self-generative processes continue inside the categories labelled labour and nature while being kept out of sight, and names the gendered caring economy and the stressed ecological base as the instances. The present paper adds no part of that.

The differentiation concerns the order of explanation. In Eglash's account the invisibility of the caring economy accompanies extraction and is read through it: value is alienated, and the self-generative processes behind the alienated flow are thereby out of view. The claim developed here is that a positional condition on observation obtains whether or not extraction occurs, so that the same illegibility appears in a household evaluating a prospective member, where no value is being extracted from anyone, and in a research field assessing an unfamiliar programme, where the assessing parties stand to gain nothing. The present account therefore works one layer earlier: it concerns the conditions under which generation is observable at all, and a contribution that is not observable to the parties who allocate cannot enter the circuit whose closure Eglash's criterion concerns.

### *3.3 Local knowledge and the limits of its transmission in Hayek*

Hayek's account of the knowledge problem holds that the knowledge on which an economy runs is dispersed, that much of it is knowledge of the particular circumstances of time and place, and that such knowledge cannot be conveyed in statistical form to any central authority [Hayek (1945)]. A centre receives what survives aggregation, and what survives aggregation excludes precisely the knowledge held by the party on the spot.

The concession is complete and the priority is Hayek's. The structure of the present argument is the structure of his: material available at a position fails to reach a party at a distance, and the failure is a property of the material and the distance in place of a deficiency of the recipient.

Two differences bound the transfer. Hayek's contrast is between knowledge held locally and knowledge held centrally, and it concerns knowledge of circumstances; the contrast here is between two modes in which a party holds VALUE, and it concerns the evidence by which one party's holding is discriminated from another's. And Hayek's conclusion is institutional, a case for a mechanism that economises on transmitted knowledge; the present account draws no institutional conclusion and §12 says why. What this paper adds to his is the asymmetry: Hayek's dispersed knowledge is lost symmetrically across content, while Proposition 6.1 concerns a loss selective by mode.

### *3.4 Tacit knowing in Polanyi*

Polanyi's thesis that we can know more than we can tell establishes that a substantial class of what a person knows resists articulation, that such knowing is exhibited in performance in place of statement, and that it is acquired through participation [Polanyi (1966)].

The concession is complete. The differentiation is that Polanyi's subject is the knower's

own inarticulate knowledge, while the object here is the evidence available to a third party about a relation between two others. The two are connected, since a participant's knowledge of what a relation makes possible is frequently tacit in his sense, and §5 gives a different reason for the transmission failure: the counterfactual form of the indicator, which would resist transmission even where the participant's knowledge was fully articulate.

### *3.5 Observability and incentive in contract theory*

Contract theory has established the consequences of differential observability with a precision the present account does not attempt. Spence's signalling model shows that parties invest in attributes whose observability is high, whatever those attributes contribute [Spence (1973)]. Holmström and Milgrom's multitask analysis establishes the result closest to this paper: where an agent allocates effort across tasks that differ in how well they can be measured, incentives attached to the measurable tasks draw effort away from the others, and the optimal contract may therefore provide weak incentives or none [Holmström & Milgrom (1991)].

The concession is unreserved and the result is stronger than anything proved here. What Proposition 6.1 supplies is upstream of it. Contract theory takes the measurability of a task as given and derives the consequences; the present account asks why the measurability of a contribution should be distributed as it is, and answers in terms of the evaluator's position and the range of the indicator. The two accounts compose: the legibility asymmetry supplies a reason for the measurement structure whose consequences the multitask model derives.

The differentiation also bounds what this paper may claim about conduct. Reactivity effects of the kind §11 predicts are already established in that literature and in the sociology of quantification, and no part of them is claimed here.

### *3.6 State legibility in Scott*

Scott's account of legibility holds that the modern state renders populations, land and practice into forms it can count, tax and administer, and that the simplifications constituting that rendering are not neutral summaries but interventions which reshape what they describe [Scott (1998)]. Local and practical knowledge is characteristically what the simplification omits, and the omission is consequential where the administered scheme is imposed with sufficient force.

The concession is full, and Scott supplies the mechanism by which a representation acts back on its object, which the present account uses at §8 and does not re-argue. Two differences bound the transfer. Scott's simplifier is a centre with administrative purposes, so the omission is explained by what the centre needs; the account here concerns an evaluator with no administrative purpose and no power over the evaluated, and the same omission appears. And Scott's contrast term is practical knowledge held locally, where the contrast term here is a mode of value, which cuts across the local and the codified alike.

### *3.7 Classification and its residual categories in Bowker and Star*

Bowker and Star establish that classification systems carry consequences for what can be seen, said and done, that every system generates residual categories into which non-conforming material is placed, and that the work of maintaining a classification is itself characteristically invisible [Bowker & Star (1999)]. Their residual category is the formal counterpart of what the present paper treats as illegible material.

The concession is full. The differentiation is that a residual category is a feature of a scheme and can in principle be repaired by a better scheme, whereas the material at issue here is withheld by the evaluator's position and is unaffected by refinement of the scheme. A classification maintained by non-participants and refined indefinitely does not thereby acquire access to what participation affords.

### *3.8 Commensuration and reactivity in Espeland, Stevens and Sauder*

Espeland and Stevens [Espeland & Stevens (1998)] describe commensuration as a social process which transforms qualities into a common metric, and record that the transformation both enables comparison and destroys the information that made the compared items distinct. Espeland and Sauder show that public measures are reactive: parties alter their conduct in response to being measured, and the two mechanisms they identify are self-fulfilling prophecy and commensuration [Espeland & Sauder (2007)]. Their case is the ranking of law schools, where administrators critical of the method describe themselves as unable to disregard it.

The concession is full, and reactivity is imported as the mechanism by which an evaluative regime alters the formation it assesses. The differentiation concerns what the metric loses. On the commensuration account the loss falls on distinctions of quality within a compared set, and it falls symmetrically. The claim here is that the loss is asymmetric by mode: what survives commensuration is disproportionately the allocative material, since that is the material the metric can be built from at a distance. This is a claim about the composition of the surviving set and not about its size, and it is not stated in the commensuration literature.

### *3.9 Quantification and its critics*

Porter's account of quantification traces the pursuit of objectivity through numbers to the weakness of authority in the settings where it is most insisted upon, so that the numerical form is a response to distrust [Porter (1995)]. Muller and Merry document the displacement of judgement by metrics across public and professional settings and the costs that follow [Muller (2018), Merry (2016)]. Fourcade and Healy describe the classification situations that scoring regimes create and the life chances they distribute [Fourcade & Healy (2013)].

The concession is full, and Porter supplies a point the present account depends on: the numerical form is adopted where trust between the parties is absent, which is to say where

the evaluator stands outside the relation. §5 takes this as corroboration of the positional claim from an independent direction. The differentiation is that this literature treats the metric as the object of criticism, while the present account treats the metric as a downstream consequence of an evidence structure that would constrain a purely qualitative evaluator in the same direction.

### *3.10 Looping effects in Hacking*

Hacking's looping effects establish that classifications of people interact with the people classified, who alter under the description, so that the object of a human classification moves in response to it [Hacking (1995)]. The present account concedes the mechanism outright and adds only its site.

### *3.11 Reproductive and care labour in feminist economics*

A substantial literature establishes that the labour sustaining a workforce is excluded from the accounts by which economies are measured, that the exclusion is neither accidental nor neutral, and that measurement conventions for national accounts have been contested on exactly this ground [Waring (1988)]. The concession is full and the priority is theirs. The differentiation is one of extension: the mechanism proposed here predicts the same illegibility for contributions carrying no gendered division at all, and §7 supplies the structural reason.

**Claim 3.1. (The residue left by prior formulations).** *Existing formulations locate the invisibility of contribution in the selection of indicators, in the dispersion of knowledge across positions, in the inarticulacy of what a knower knows, in the incentive consequences of differential measurability, in the interests of a simplifying centre, in the residual categories of a classification, in the losses of commensuration, in the politics of measurement, or in the extraction of generated value. Where an evaluator is sincere, holds no administrative purpose, refines the scheme without limit, and extracts nothing, the invisibility persists. Its persistence is settled by the evaluator's position with respect to the relation assessed, and by that alone.*

# Part II

# The Mechanism of Positional Illegibility

## 4 The Two Modes of Value and the Evidence Each Makes Available

This section fixes the distinction on which the argument rests and states it in evidential terms. Its objective is to establish that the two modes differ in what they make available to an observer, and its method is to give the distinction first in terms of holding and then in terms of the indicators through which a holding becomes known. The section closes by recording what the distinction does not assert.

### *4.1 The distinction stated in terms of holding*

A party holds value *allocatively* when the value consists in a stock the party possesses independently of any particular relation: income, credentials, titles, equipment, tenure, published work, property. Such a holding is individuated by reference to the party alone. It survives the dissolution of any relation the party stands in, and it is transferable in the sense that its description carries to a new setting without alteration.

A party holds value *generatively* when the value consists in what a relation containing that party makes possible for its participants: the capability a colleague raises, the steadiness a partner supplies over a long horizon, the trust a neighbour maintains, the corrections a reviewer produces in work that is not theirs. Such a holding is individuated by reference to the relation. It has no description that omits the other party, and it does not survive the dissolution of the relation, though its effects may.

The distinction admits a compact formal statement, and the statement is worth having because it fixes what is meant by a description that omits the other party. Let a pair of parties carry a joint state. An allocative holding is one for which the joint state factorises, so that a description of the first party alone is available and the joint description adds nothing about that holding. A generative holding is one for which the joint state does not factorise, so that no description of the first party alone is available. The difference matters for the argument that follows, since in the second case what a distant observer receives is a marginal of a joint state and never an incomplete report of a state the party possesses. The strong form of this contrast, in which a completely determinate joint state is compatible with a completely indeterminate marginal, has no counterpart in classical probability, so the formal statement above is entered here as a structural characterisation and carries no claim that social systems exhibit any physical phenomenon.

The distinction is one of mode and not of importance, of moral standing, or of magnitude. The same party ordinarily holds value in both modes at once, and a holding in one mode frequently supports a holding in the other.

### *4.2 The distinction restated in terms of indicators*

Following Star and Strauss, a holding becomes known through indicators, and the inference from indicator to holding may be short or long [Star & Strauss (1999)]. The two modes differ in the indicators available.

An allocative holding has indicators that are themselves artefacts: a salary figure, a degree certificate, a title in a register, a list of publications, a deed. Such artefacts are produced for transmission, they are stable under transmission, and the inference from artefact to holding is short and can be performed by a party with no acquaintance with the holder.

A generative holding has indicators that are events within the relation: an exchange after which one party can do something previously beyond them, a period during which a difficulty was borne and did not become a crisis, a sequence of small corrections that prevented an error from propagating. Such events are not produced for transmission. They are

frequently unmarked at the time of occurrence, they lack a natural artefactual residue, and the inference from them to the holding requires knowledge of the counterfactual course of the relation, which is available to the participants and to no one else.

### *4.3 Positions the distinction leaves open*

The distinction asserts no ordering. No claim is made that generative holdings are more valuable, more deserving of reward, or more fundamental than allocative holdings, and the argument of this paper is consistent with a reader who ranks them in the opposite direction.

The distinction asserts no exhaustiveness. Holdings that fall clearly under neither heading are not thereby denied; the argument requires only that a substantial class of holdings falls under each.

The distinction asserts no correlation with any social category. Parties of every description hold value in both modes, and §7 establishes that the mechanism proposed here operates where no division by category is present at all.

## 5 The Observation Condition on Generative Holdings

This section states the condition that carries the argument. Its objective is to establish that the indicators of a generative holding degrade with the observer's distance from the relation, and its method is to identify the feature of those indicators responsible for the degradation and then to give three independent corroborations. The section closes by bounding the condition.

### *5.1 Distance from a relation and the transmission of indicators*

Let the *distance* of an observer from a relation be the number of relational steps separating the observer from participation in it. An observer at distance zero is a participant. An observer at distance one receives an account from a participant. An observer at greater distance receives an account of an account, and so on outward through the ordinary chains by which information about parties reaches those who assess them.

The claim is that indicators differ in the distance over which they remain discriminable, and that the difference tracks the mode. Call the number of steps over which an indicator remains discriminable its *range*. Artefactual indicators have long range, since an artefact produced for transmission passes through a chain with its discriminating content intact: a salary figure at distance five discriminates exactly what it discriminates at distance one. Event indicators have short range, since what must be transmitted is a difference between the course a relation took and the course it would otherwise have taken, and that difference is registered by the parties who underwent both sides of it.

### *5.2 The feature responsible for the degradation*

The degradation follows from the counterfactual form of the generative indicator. To report that a colleague raised a capability is to report a comparison between what occurred and what would have occurred absent the relation. The second term of that comparison is available to the participants as experience and is available to a distant observer only as testimony, which the observer must then weigh without access to the comparison that would license the weighing.

This is a structural feature and not a deficiency of effort. A participant who wishes to transmit the holding faces the same obstacle as the observer who wishes to receive it: the material has no artefactual form that carries the comparison. Increasing the volume of testimony does not supply the missing term, and a distant observer who receives more testimony receives more material of the kind whose weighing was the difficulty.

### *5.3 Corroborations from three independent directions*

Porter's history of quantification supplies the first [Porter (1995)]. He finds that recourse to numerical form is heaviest where personal authority is weakest and trust between the parties thinnest, which is to say where the assessing party stands outside the relation assessed. On the present account this is what would be expected, since the numerical form is built from the indicators that survive distance.

The reactivity literature supplies the second [Espeland & Sauder (2007)]. Parties subject to public measurement reorganise conduct toward the measured dimensions. On the present account the measured dimensions are disproportionately the transmissible ones, so reactivity should press conduct toward allocative production, which is what its case material reports.

The record of invisible work supplies the third [Star & Strauss (1999), Waring (1988)]. The categories of work that recur in that record, care, maintenance, repair, articulation, coordination, share the feature identified here: their product is a difference between what happened and what would have happened, and they leave no artefact when they succeed.

### *5.4 Restrictions placed on the observation condition*

The condition concerns discriminability and not existence. A distant observer may know perfectly well that generative holdings exist and may believe sincerely that a party has them. What the condition denies is the availability of material by which one party's generative holding is discriminated from another's.

The condition admits exceptions and does not require their absence. Some generative holdings acquire artefactual residues, and some institutions manufacture such residues deliberately. §9 treats these as the interesting cases, since they show the range of an indicator to be alterable by design.

The condition is stated over positions and never over persons. No party is held to be

incapable of perceiving generative value, and a party moves between positions in the ordinary course of life.

## 6 The Legibility Asymmetry

This section states the paper's central result. Its objective is to establish that the composition of the evidence available to an evaluator shifts toward allocative material as the evaluator's distance rises, and its method is a minimal order-theoretic construction over the carrier of §5 together with a proof of three clauses. The third clause corrects a natural but incorrect statement of the thesis.

### *6.1 The carrier*

Let $A$ be a finite set of value-bearing attributes carried by a relation, partitioned into allocative attributes $A_a$ and generative attributes $A_g$, with $|A_a| = n_a$ and $|A_g| = n_g$. Each attribute $i$ carries a range $r_i \in \{1, 2, \dots\}$ in the sense of §5. An evaluator stands at distance $d$, and attribute $i$ is *legible* to that evaluator exactly when $r_i \geq d$. Write $S_a(d)$ and $S_g(d)$ for the survival functions of the range distributions over $A_a$ and $A_g$, and define the *allocative share* of the legible set as

$$\sigma(d) \;=\; \frac{n_a S_a(d)}{n_a S_a(d) + n_g S_g(d)}.$$

The quantity so defined is a ratio of expected counts and no expectation of a ratio. Writing $L_a(d)$ and $L_g(d)$ for the numbers of legible attributes of each mode, $\sigma$ is $\mathbb{E}[L_a]/(\mathbb{E}[L_a] + \mathbb{E}[L_g])$, which differs from $\mathbb{E}[L_a/(L_a + L_g)]$ in general. The two are reported separately at §7, and the difference between them is a finite-sample effect that vanishes as the number of attributes grows. Every claim below is a claim about $\sigma$ as defined. No probability measure over outcomes is introduced, no ordering by accuracy is assumed, and no metric on attributes is required. The construction carries exactly the distinction of §4 and the range notion of §5, and nothing further.

**Proposition 6.1. (The legibility asymmetry).** *(i) If the survival ratio $S_a/S_g$ is non-decreasing, which is the hazard-rate order on the two range distributions, then $\sigma$ is non-decreasing in $d$. (ii) The conclusion is independent of $|A|$, of the evaluator's diligence, and of the recording capacity available, none of which enters the hypothesis. (iii) First-order stochastic dominance of the allocative range distribution is insufficient: there exist range distributions with $S_a \geq S_g$ pointwise for which $\sigma$ is non-monotone.*

### *6.2 Proof of the three clauses*

For clause (i), write $\rho(d) = n_g S_g(d)/(n_a S_a(d))$, so that $\sigma(d) = 1/(1 + \rho(d))$. Since $\sigma$ is strictly decreasing in $\rho$, and $\rho$ is non-increasing exactly when $S_a/S_g$ is non-decreasing, the claim follows immediately.

For clause (ii), the counts enter $\sigma$ only through the ratio $n_g/n_a$, which is constant in $d$; hence scaling $|A|$ at fixed composition leaves $\sigma$ pointwise unchanged. The independence holds of $\sigma$ as defined and does not hold of the expected ratio, which carries a finite-sample dependence on the number of attributes; §7 reports its size. Diligence and capacity enter the model nowhere, since the construction fixes which attributes are discriminable and says nothing about how many of the discriminable ones an evaluator troubles to consult. An evaluator of unlimited diligence consults the whole legible set, and the whole legible set is what $\sigma$ describes.

For clause (iii), pointwise dominance constrains the sign of $S_a - S_g$ and leaves the monotonicity of $S_a/S_g$ free. A pair of survival functions satisfying dominance while crossing in hazard rate therefore produces a non-monotone share, and §7 exhibits one.

### *6.3 The reading clause (iii) forces*

Clause (iii) matters because the thesis is naturally stated in the weaker form: allocative indicators travel further, therefore distant evaluation favours them. That statement is false as it stands. What is required is that the allocative advantage in range be *sustained across the whole span of distances*, which is what the hazard-rate condition asserts. Where the advantage is concentrated at short distances and dissipates thereafter, an intermediate evaluator sees a more allocative evidence set than either a participant or a very distant party, and the bias is not monotone in distance at all.

The consequence for the argument is a restriction in place of a loss. The claim of this paper is entered under the hazard-rate condition, §7 exhibits the condition's failure as well as its satisfaction, and Part IV asks at each site whether the condition holds there.

## 7 Verification of the Legibility Asymmetry

This section reports the numerical verification of Proposition 6.1. Its objective is to confirm each clause on an explicit construction before the proposition is used, and its method is a closed-form evaluation of $\sigma$ together with a Monte-Carlo evaluation over sampled attribute sets. The script is `verify/legibility.py` and is supplied with the paper.

### *7.1 Construction used in the verification*

Ranges are drawn geometrically, which fixes a constant hazard for each mode and so places the two distributions in hazard-rate order by construction whenever the parameters differ. The allocative parameter is $p_a = 0.12$ and the generative parameter $p_g = 0.45$, giving mean ranges of roughly $8.3$ and $2.2$ steps. Attribute counts are $n_a = n_g = 40$, so that $\sigma(1) = 0.5$ exactly and any departure from one half is produced by the range structure alone. Distances run from $1$ to $12$. The Monte-Carlo evaluation draws $4000$ independent attribute sets.

**Table 1:** Allocative share $\sigma(d)$ of the legible evidence set, by evaluator distance. Columns two and three give the hazard-ordered construction in closed form and under $4000$ Monte-Carlo draws. Column four gives the constructed pair satisfying first-order dominance without hazard-rate order.

| $d$ | $\sigma$ (closed form) | $\sigma$ (Monte Carlo) | $\sigma$ (dominance only) |
|---|---|---|---|
| 1 | 0.5000 | 0.5000 | 0.5000 |
| 2 | 0.6154 | 0.6169 | 0.7500 |
| 3 | 0.7191 | 0.7210 | 0.6250 |
| 4 | 0.8038 | 0.8065 | 0.6000 |
| 5 | 0.8676 | 0.8690 | 0.5714 |
| 6 | 0.9129 | 0.9138 | 0.5484 |
| 7 | 0.9437 | 0.9443 | 0.5283 |
| 8 | 0.9641 | 0.9643 | 0.5238 |
| 9 | 0.9772 | 0.9777 | 0.5161 |
| 10 | 0.9857 | 0.9855 | 0.5238 |
| 11 | 0.9910 | 0.9911 | 0.5385 |
| 12 | 0.9943 | 0.9943 | 0.5556 |

### *7.2 Results obtained for the three clauses*

Table 1 reports the closed-form and sampled values of $\sigma$. The allocative share rises from $0.5000$ at $d = 1$ to $0.9943$ at $d = 12$, with zero monotonicity violations in eleven steps in closed form and zero in the sampled evaluation. By $d = 4$ the share is $0.8038$, so that four relational steps from a relation four fifths of the discriminable material concerns holdings the party would carry into any setting whatever.

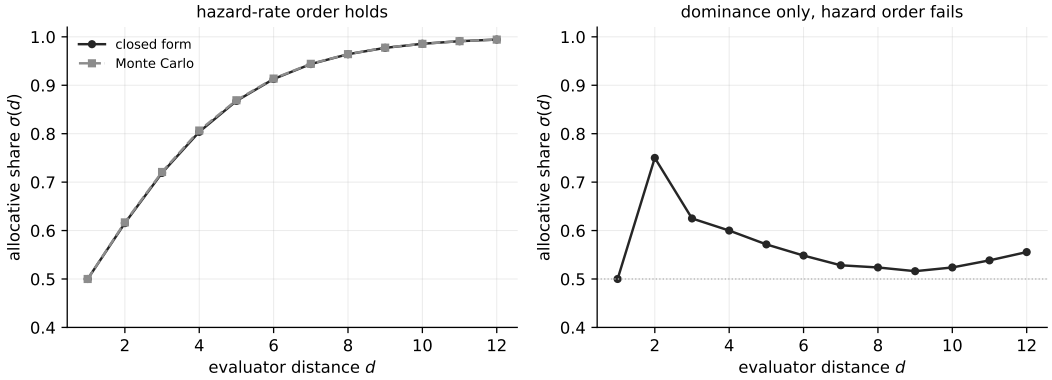
Clause (ii) is confirmed by evaluating $\sigma$ at $|A| \in \{4, 10, 40, 200, 1000\}$ with composition held fixed. The maximum pointwise deviation across those five sizes is $1.11 \times 10^{-16}$, which is floating-point noise. The expected ratio behaves differently and its departure from $\sigma$ is reported here so that no reader mistakes the two: the maximum pointwise difference is $0.024$ at four attributes per mode, $0.009$ at ten, $0.003$ at forty and $0.0005$ at two hundred. The sampled column of Table 1 is therefore close to $\sigma$ at the size used and is not equal to it. The share is therefore a property of the composition and the range structure, and no quantity of recorded attributes alters it.

Clause (iii) is confirmed on a constructed pair of survival functions satisfying $S_a \geq S_g$ at every distance while crossing in hazard rate. The resulting share rises to $0.7500$ at $d = 2$ and then falls monotonically to $0.5161$ at $d = 9$ before recovering slightly, giving seven monotonicity violations in eleven steps. Dominance alone therefore fails to deliver the result, exactly as clause (iii) states.

### *7.3 The headline result and its correct scope*

The result carried by Table 1 and Figure 1 is that an evaluator standing four steps from a relation sees an evidence set four fifths of which concerns transferable holdings, on a construction in which the relation carries equally many attributes of each mode and the evaluator consults every attribute available. The distortion is produced by the transmission

**Figure 1:** Allocative share of the legible evidence set against evaluator distance. The left panel gives the hazard-ordered construction, in closed form and under $4000$ Monte-Carlo draws. The right panel gives a pair of range distributions satisfying first-order stochastic dominance while crossing in hazard rate, where the share peaks at $d = 2$ and declines thereafter.




structure and by nothing the evaluator does.

Three overreadings are excluded. The construction supplies no estimate of any real distribution of ranges, and the parameters are illustrative; what is verified is the behaviour of $\sigma$ under stated hypotheses, and the empirical question of which hypotheses hold at a given site is left to Part IV. The result licenses no inference that distant evaluation is inaccurate, since an evaluator may be entirely accurate about the allocative material and the result concerns composition alone. And the result identifies no wrong, for the reason given at §2: the question of when representational loss becomes injustice is treated in the companion paper and is not settled here.

# Part III

## Consequences for Three Standing Arguments

## 8 The Appeal to Scale and the Limits of Coarse-Graining

This section examines the explanation most often given for the disappearance of ordinary contribution, which is that large systems must aggregate and aggregation loses detail. Its objective is to establish that the explanation is weaker than it appears and that the result of §6 supplies what it lacks. The method is to state the appeal in the strongest form its own theory supports, and then to identify the feature of that theory which turns it against the party making the appeal.

### *8.1 The appeal stated at full strength*

The appeal runs as follows. A description of a large formation cannot carry every property of its constituents. Descriptions at higher scales are therefore constructed by coarse-graining, in which many microscopic configurations are mapped to one macroscopic vari-

able. Individual contributions vanish from the higher description for the same reason individual molecules vanish from a description in terms of temperature and pressure. The disappearance of the ordinary contributor is thus a consequence of a necessary operation and carries no imputation against anyone.

The appeal is stated at full strength because it is largely correct, and because the theory it invokes is precise enough to be checked.

### *8.2 The feature of the theory which reverses the appeal*

The theory of coarse-graining does not hold merely that detail is lost. It holds that detail is lost *because it is irrelevant to the macroscopic observable*. In the renormalisation-group treatment, couplings are classified as relevant or irrelevant according to their behaviour under repeated rescaling, and the content of universality is that systems differing arbitrarily in their microscopic constitution exhibit identical macroscopic behaviour, since the differences reside in irrelevant couplings. Batterman's analysis makes the point in the strongest available form: the coarse-graining apparatus is what *explains* the autonomy of higher-level description [Batterman (2002)].

A party who invokes coarse-graining to explain why the ordinary contribution disappears has therefore invoked a body of theory whose content is that the omitted material makes no difference to what the higher description is about. The appeal does not excuse the loss; it denies that anything was lost. Any argument that proceeds from coarse-graining to a complaint about the omission is committed to both halves of a contradiction.

### *8.3 The supplement the legibility asymmetry supplies*

Proposition 6.1 supplies what the appeal lacks, which is selectivity. Coarse-graining as such is indifferent to the content of what it discards; it discards whatever the macroscopic variable does not depend on, and the discarding is symmetric across microscopic content of every kind. The result of §6 concerns a loss that is asymmetric *by mode*, so that the surviving description is not a smaller sample of the original but a differently composed one.

The difference matters for what can be inferred. From a symmetric loss nothing follows about which parties are advantaged by the description that survives. From an asymmetric loss it follows that parties holding value predominantly in the mode with shorter range are represented less adequately in the surviving description, at every distance, whatever the description's purpose.

### *8.4 The condition under which fine-grained material becomes load-bearing*

One feature of the theory works in the other direction and should be recorded, since it converts a moral demand into a question about system behaviour. Irrelevance is a property relative to a fixed point. Near a critical boundary the correlation length grows without bound, and microscopic fluctuations propagate to macroscopic scales; the couplings that

were irrelevant in the ordinary regime are the ones that carry the transition. A system that has permanently discarded its capacity to resolve fine-grained material has therefore discarded it precisely against the regime in which such material becomes load-bearing.

The observation is recorded and is not developed here. It carries a substantial antecedent, namely that the formation in question approaches a stability boundary, and establishing that antecedent for any particular social formation lies outside this paper. The point is registered because it locates the argument for retention in the behaviour of systems and not in a preference about representation, and §10 gives the version of the argument that requires no such antecedent.

## 9 The Budget and the Distortion Measure

This section treats the standing objection from scarcity. Its objective is to establish that a resource constraint fixes how much can be retained and never fixes what is retained, and its method is to restate the problem in the vocabulary of lossy compression, where the two quantities are separated by construction. The section closes by bounding the transfer.

### *9.1 The objection stated at full strength*

Attention, administration, memory and record-keeping are limited. A formation of any size cannot maintain the resolution toward each of its members that a small group maintains toward each of its own. Any proposal to represent contribution more finely therefore proposes an expenditure, and the expenditure competes with every other use of the same resources. The objection is sound, and no argument in this paper denies it.

### *9.2 The separation the objection overlooks*

A lossy representation is specified by two independent components. The first is a *rate*, which is the quantity of description permitted. The second is a *distortion measure*, which fixes what counts as a costly discrepancy between the original and its representation. Shannon's rate–distortion theory establishes the relation between them, giving for each admissible distortion the minimum rate that achieves it, and the theory is defined only once a distortion measure has been supplied [Shannon (1959), Cover & Thomas (2006)]. The information-bottleneck formulation makes the dependence explicit by fixing the distortion in terms of information retained about a designated variable, so that the compression preserves what is relevant to that variable and discards the rest [Tishby, Pereira & Bialek (1999)].

The separation is the whole of the reply. Scarcity fixes the rate. It leaves the distortion measure entirely undetermined. Two representations of a formation may consume identical resources while differing completely in which discrepancies they treat as costly, and the selection between allocative and generative material is made in the distortion measure and

nowhere else. An objection from scarcity therefore establishes that some material must go and establishes nothing whatever about which material that is.

### *9.3 The question the separation opens*

Once the two components are separated, the substantive question becomes determinate and is a question about authority: which party fixes the distortion measure under which a formation represents its own members. The question is answerable in a way that the undifferentiated complaint about scarcity is not, since the parties who set evaluative criteria are ordinarily identifiable, and their position with respect to the relations being evaluated is ordinarily ascertainable.

Proposition 6.1 then bears on the answer. A party who sets the distortion measure from outside the relations concerned is subject to the same asymmetry as any other distant observer, so the measure will be built from the material available at that distance. The composition of an evaluative regime is thus explained without recourse to any imputation of motive, and the explanation is available in the case where the setting party is entirely well disposed toward the parties evaluated.

### *9.4 Restrictions placed on the transfer*

The transfer is conceptual and no rate–distortion calculation is offered. A calculation would require a source distribution over the material to be represented and a numerical distortion function, and neither is available for the objects at issue. What transfers is the separation of the two components, which is a structural feature of any lossy representation and holds independently of whether the quantities can be computed.

No claim is made that a distortion measure sensitive to generative material can presently be specified. §12 records that the specification is unavailable, and gives the reason.

## 10 The Justification from Option Value

This section supplies the justification for retaining material whose future use cannot be specified. Its objective is to establish that the justification requires no prediction about which contribution will later matter, and its method is to apply the standard treatment of irreversibility under uncertainty and then to check its three conditions against the case. The section closes with the limits of what the argument delivers.

### *10.1 The demand the justification must meet*

A recommendation to retain fine-grained material invites an immediate demand: state the benefit. The obvious form of answer is that some retained contribution will later prove valuable. That answer is unavailable. It requires an inference from present material to a future state of an open social system, and no warrant supports such an inference at the

horizons in question. A justification resting on it would be a justification resting on a prediction that the party offering it is in no position to make.

### *10.2 The standard treatment of irreversibility under uncertainty*

Arrow and Fisher, and Henry independently, establish that where a decision is uncertain in its consequences, where one option forecloses possibilities the other preserves, and where information is expected to arrive, there is a positive value attaching to the preserving option over and above its expected direct benefit [Arrow & Fisher (1974), Henry (1974)]. The quantity is the quasi-option value, and it is positive under those three conditions alone. It requires no estimate of which future contingency will obtain, and it is not an expression of risk aversion; Fisher and Hanemann establish that the quantity survives risk neutrality and is distinct from the option value associated with attitudes to risk [Fisher & Hanemann (1987)].

### *10.3 The three conditions checked against the case*

*Uncertainty* holds by the argument of §10.1: which contributions will later matter is exactly what is unavailable.

*Irreversibility* holds by a feature of records specifically. A contribution that was never recorded cannot be recovered later by any expenditure, since the material that would have supported the reconstruction is the material that was not produced. This is the asymmetry that makes the case a case of irreversibility in the required sense: retention is reversible, since retained material may always be discarded afterwards, while non-retention is not.

*Expected learning* holds because the criteria by which contribution is assessed demonstrably change. §3 records several such changes, and the historical literature on measurement conventions supplies more. A party who holds that assessment criteria have reached their final form is committed to a position that the record of the last century refutes.

### *10.4 Properties of the option-value justification and its withheld claims*

The argument delivers a justification with three properties worth stating plainly. It requires no moral premise, so it is available to a reader who rejects every normative commitment in this paper. It requires no prediction, so it is untouched by the objection of §10.1. And it is stated in the currency of the objection from scarcity, since a positive quasi-option value is an item on the same ledger as the cost of retention.

Three things are withheld. The argument establishes the sign of the quantity and not its magnitude, so it settles no case in which the cost of retention is high and cannot be used to license an expenditure of any particular size. It applies to the irreversible component of a representational decision alone, so material that could be reconstructed later falls outside it. And the concept must be used in its own sense: the quasi-option value of Arrow, Fisher, Hanemann and Henry is not equivalent to the option value of the investment literature, and the two have been shown to come apart [Mensink & Requate (2005)]. Part IV

## The Result at Four Sites

### 11 Application of the Result at Four Evaluative Sites

This section applies Proposition 6.1 at four sites. Its objective is to establish that the sites differ in the dimension the account treats, which is the position of the evaluator, while resembling one another in the features that would otherwise explain the phenomenon, and to determine at each site whether the hazard-rate condition of clause (i) obtains. Its method is a common template: the relation and the evaluator's position, the indicators available at that position, the standing of the hazard-rate condition, and what the account predicts. The section closes with a carrier result that all four sites share, together with its verification.

#### *11.1 Household evaluation of a prospective member*

The relation is between two people who propose to form a household. The evaluators are family members who stand at one or two relational steps: they receive accounts of the relation, and in the ordinary case they receive them from one participant.

The indicators available to a participant include the whole class of event indicators described at §5: the effect of the relation on what each party attempts, sustains and recovers from. The indicators available at one or two steps are the transferable ones, and the questions characteristically put at that distance ask after income, dwelling, occupation and prospective role. Those questions are frequently described as materialistic. The account gives a different reconstruction: they are the questions whose answers survive the distance at which they are asked.

The hazard-rate condition holds at this site, since no device converts the event indicators into transmissible artefacts and the allocative advantage in range is accordingly sustained. Two consequences follow. The disagreement is not a disagreement about facts, since the parties are not weighing one evidence set differently but holding different evidence sets. And the evaluating party is reasoning well: an evaluator who bears the consequences of a bad outcome, and who holds only the transferable material, is right to weight what is available and verifiable, so the position is rationally reconstructible without any

imputation of narrowness.

### *11.2 Ordinary contribution within a workplace*

The relation is between a worker and the colleagues, tasks and clients the work engages. The evaluators occupy a graded series of positions: a supervisor at one step, a personnel function at two, a promotion or reduction committee at three or more.

The indicators available fall out as the account predicts. Output counts, credentials, attendance and formally assigned responsibilities are artefactual and survive the whole series. The contributions whose product is a difference between what happened and what would have happened, which is to say the anticipation of a fault, the steadying of a colleague, the small correction that prevented a propagation, leave no residue when they succeed. This is the class Star and Strauss enumerate [Star & Strauss (1999)], and its members share the structural feature identified at §5.

The hazard-rate condition holds at this site in the default case and is alterable by design, which makes the workplace the clearest illustration of §11.5 below. The account predicts that the assessment of a worker becomes more allocative as it rises through the series, that the prediction holds with every evaluator sincere, and that a worker aware of the gradient has reason to redirect effort toward artefact production, the last being the reactivity effect documented by Espeland and Sauder [Espeland & Sauder (2007)].

### *11.3 Evaluation within an academic field*

The relation is between a researcher and the work, students, collaborators and readers the research engages. The evaluators are again graded: a collaborator at zero steps, a referee at one with respect to a particular manuscript, a departmental committee at two or three, a national assessment exercise at more.

This site is the interesting one, because the field maintains a device that leaves transmissible traces of acts whose product is otherwise an event inside a relation. A citation is a durable public record that a piece of work enabled a later piece, and a version-control history is a durable public record that a contribution entered a shared artefact. Such devices give a subclass of generative attributes a range they would otherwise lack. Other generative contributions in the same field, and in particular refereeing, supervision, correction and the maintenance of shared resources, have no such device and retain the short range of §5.

The hazard-rate condition therefore holds at this site only under a further condition on the devices, which §11.5 states and verifies. The account's prediction here is accordingly conditional and is the sharpest test available to it.

### *11.4 Public measurement of an economy*

The relation is between a party and the households, communities and environments the party's activity engages. The evaluator is a measurement regime at the greatest distance

the account contemplates, since national accounts are constructed from returns that have passed through many intermediate renderings.

The indicators available are the artefactual ones exclusively, and the literature on national accounting has established for decades that the labour sustaining a workforce is excluded from them [Waring (1988)]. The hazard-rate condition holds at this site and holds strongly, since no device of the kind described at §11.3 exists for domestic care, and Proposition 6.1 then places the allocative share close to its ceiling.

The account adds two things to the existing treatment. It predicts the exclusion without appeal to any division by social category, which is the extension recorded at §3. And it locates the remedy in the distortion measure of §9 in place of the rate, so that the familiar reply that fuller accounts would be prohibitively expensive misses its target.

### *11.5 Artefactual carriers and the two results they admit*

The four sites differ in one respect that the account can treat formally. Call a device that leaves a transmissible trace of a generative act an *artefactual carrier*. A citation is one, a version-control record is one, a signed review is one, and a structured record of who was consulted before a decision is one. A carrier does not convert a generative attribute into an allocative attribute, since what it records remains a property of a relation. It alters that attribute's range.

What a carrier records requires care, and stating it wrongly would put the account in an untenable position. A carrier records *participation* and never a share of contribution. The distinction is forced by §4: a generative holding is individuated by reference to a relation and admits no description omitting the other party, so a quantity of the form "the portion of this outcome produced by this party" is not defined for holdings of that mode. A version-control record does not assert that a contributor caused a project to succeed; it asserts that the contributor was present and performed a determinate act. The first assertion has no truth value on this account, and the second is verifiable. The carriers named above are all of the second kind, and any device of the first kind lies outside what the account recommends.

The restriction is not a weakening. Circulation among participants, which is the structure this account borrows from generative justice [Eglash (2016)], requires an identification of the participants and requires no apportionment among them. Apportionment belongs to the allocative mode, where holdings are individuated by reference to a party alone and shares are therefore defined.

Let a fraction $c$ of generative attributes be carried, and let the carrier have survival function $S_c$, so that the effective generative survival function is $S_g^{\text{eff}} = (1-c)S_g + cS_c$. Two results follow, and they are verified in `verify/carrier.py` and reported in Table 2 and Figure 2.

Say that a carrier is *no more durable* than the allocative artefacts when $S_c/S_a$ is non-increasing, which is the hazard-rate condition of §6 applied to the carrier, and *more durable* when $S_c/S_a$ is somewhere increasing.

**Proposition 11.1. (Carriers and the two regimes they produce).** *(i) Where the carrier is no more durable than the allocative artefacts, and where the hazard-rate condition of Proposition 6.1 holds, $\sigma$ remains non-decreasing in $d$. Where in addition $S_c = S_a$, the limiting allocative share is $n_a/(n_a + c\,n_g)$. (ii) There exist more durable carriers for which $\sigma$ acquires an interior maximum and declines thereafter, and for which at sufficient $c$ it falls below its value at $d = 1$. Being more durable is necessary for this and is not sufficient.*

Clause (i) is proved directly. Write $S_g^{\text{eff}}/S_a = (1-c)(S_g/S_a) + c(S_c/S_a)$. Both terms are non-increasing under the stated hypotheses, a convex combination of non-increasing functions is non-increasing, and $\sigma = 1/(1+\rho)$ with $\rho = (n_g/n_a)\,S_g^{\text{eff}}/S_a$ is therefore non-decreasing. The limit statement requires $S_g/S_a \to 0$ and $S_c/S_a \to 1$, which the case $S_c = S_a$ supplies and a general carrier need not.

Clause (ii) is an existence claim and is established by the construction reported below. Nothing here shows that every more durable carrier produces an interior maximum, and the necessity direction is what the proof of clause (i) delivers: where $S_c/S_a$ is non-increasing everywhere, no interior maximum arises.

Clause (i) refutes a hypothesis worth recording, since it was the one this paper began with. A partial carrier might be expected to relocate the maximum of $\sigma$ to an intermediate distance, on the reasoning that close and distant evaluators would both hold generative material while an intermediate evaluator held neither. The verification refutes it. Writing $\sigma = 1/(1+\rho)$ with $\rho = n_g S_g^{\text{eff}}/(n_a S_a)$, a mixture whose components are each no more durable than $S_a$ leaves $S_g^{\text{eff}}/S_a$ non-increasing, so $\sigma$ cannot turn. At $c = 0.25$ the share still rises monotonically and merely stops at $0.7989$ in place of $0.9978$. A carrier of this kind caps the asymmetry and does not reverse it.

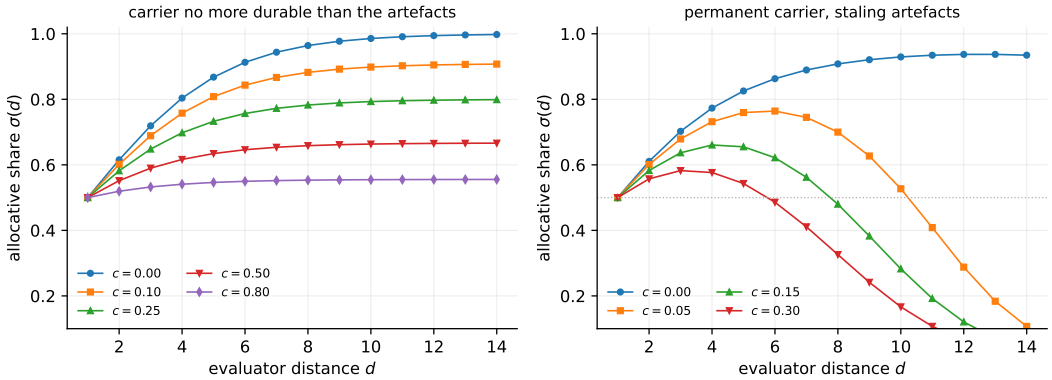
Clause (ii) identifies the condition under which reversal occurs, and the condition is demanding: the carrier must outlast the allocative artefacts it competes with. One feature of the construction should be reported so that the effect is not over-attributed. In the lower block the allocative artefacts themselves go stale, and at $c = 0$ that alone produces a single late decrease of $\sigma$ over thirteen steps. The carrier is therefore responsible for the early and large reversal, and it is not responsible for the whole of the departure from monotonicity. The case is real. A published record that one contribution enabled another persists indefinitely, while a current position, a current holding and a current income lose their discriminating force as they age. Under that pairing the verification gives an interior maximum at $d = 6$ for $c = 0.05$ and at $d = 3$ for $c = 0.30$, with the share falling to $0.1069$ and $0.0197$ respectively at the far end. At sufficient distance the surviving evidence becomes predominantly generative.

The consequence for design is narrow and should be stated as such. A carrier improves the composition of distant evidence in every case, so the recommendation to build one needs no further support. The stronger property, which is reversal, is available only where the carrier is built to outlast the allocative record, and durability is therefore the design parameter that matters and not coverage alone. §12 records what this paper declines to specify about such devices.

**Table 2:** Allocative share under artefactual carriers, by carried fraction $c$. The upper block gives a carrier no more durable than the allocative artefacts; the lower gives a permanent carrier set against allocative artefacts that go stale. Peak $d$ is the distance at which $\sigma$ is greatest and violations count decreases of $\sigma$ over thirteen steps.

| $c$ | $\sigma(1)$ | $\sigma(4)$ | $\sigma(14)$ | peak $d$ | violations |
|---|---|---|---|---|---|
| *Carrier no more durable than the artefacts* | | | | | |
| 0.00 | 0.5000 | 0.8038 | 0.9978 | 14 | 0 |
| 0.10 | 0.5000 | 0.7577 | 0.9074 | 14 | 0 |
| 0.25 | 0.5000 | 0.6978 | 0.7989 | 14 | 0 |
| 0.50 | 0.5000 | 0.6165 | 0.6662 | 14 | 0 |
| 0.80 | 0.5000 | 0.5409 | 0.5554 | 14 | 0 |
| *Permanent carrier, staling artefacts* | | | | | |
| 0.00 | 0.5000 | 0.7732 | 0.9347 | 13 | 1 |
| 0.05 | 0.5000 | 0.7316 | 0.1069 | 6 | 8 |
| 0.15 | 0.5000 | 0.6606 | 0.0386 | 4 | 10 |
| 0.30 | 0.5000 | 0.5766 | 0.0197 | 3 | 11 |

**Figure 2:** Allocative share under artefactual carriers. The left panel gives carriers no more durable than the allocative artefacts, where the share stays monotone and the carried fraction sets a ceiling. The right panel gives a permanent carrier set against allocative artefacts that go stale, where the share turns at an interior distance and falls below the dotted line at one half.




### *11.6 The objection from the non-localisability of a generative event*

An objection remains, and it is the most serious one the account faces. Where a generative event occurs between parties, it may be denied that there is any fact of the matter about which party generated it. The capability a colleague raises is raised in an encounter whose elements include both parties, their histories, the occasion and much that neither controlled. On that view the generative event is not merely hard to observe from a distance; it is not localised to any participant at all, and a device recording who generated what would be recording something that does not obtain.

The objection is granted in the form in which it is strongest, and the account is consistent with it. Nothing in this paper asserts that a generative event has a locus among its participants. Proposition 6.1 concerns the composition of an evidence set and Proposition 11.1 concerns the range of an indicator, and neither requires that any outcome be

apportioned. The carrier restriction stated at §11.5 above is what makes this consistency available: a record of participation is well formed whether or not the generative event is localisable, since it asserts presence and act and asserts nothing about production.

Two consequences follow and are worth stating. Any reading of the account on which the remedy for illegibility is a better attribution of credit is mistaken, and the account opposes such a remedy on grounds of its own. And the companion treatment of distributed responsibility in this framework is the same structure with the sign reversed: there, an outcome is produced by many hands and no participant is the locus of its production; here, a possibility is generated in a relation and no participant is the locus of its generation. The two are one result about relational events, and neither is repaired by finer measurement.

### *11.7 A formation constructing co-presence at scale*

The four sites above are all sites at which the condition of §5 holds and the account predicts a failure. A site at which the condition is deliberately defeated is available, and it is included because an account that exhibits only failures has not shown its condition to be satisfiable. The case is constructed and is marked as constructed.

Consider a performance formation whose members are recruited without prior distinction and which maintains a small resident venue, a schedule of frequent performances before audiences of a few hundred, occasions on which members and audience meet directly, and a published record in which members write in their own names over years. The formation's characteristic product is generative in the sense of §4: what a member supplies is largely the effect she has on other members and on those attending, and that effect has the counterfactual form §5 identifies.

The arrangement bears on the account in two ways.

It shortens the distance at which the assessment is made. Repeated attendance at a small venue places a large number of parties at zero or one relational step from the relation being assessed, where the corresponding assessment of a nationally distributed performer is made at four or more. The account predicts a lower allocative share at the first site than the second on the strength of position alone, and the prediction does not rest on any claim about the quality of what is produced at either.

It supplies carriers of the kind §11.5 describes, and supplies them at the participation level the restriction there requires. A dated performance record establishes that a member was present and performed; a member's own published writing over years establishes a sequence of acts; an occasion of direct meeting is attested by both parties. None of these records a share of any outcome, and by §11.6 none could.

Two features of the case are worth stating because they bear on Proposition 11.1 and not merely on the illustration. The carriers here are durable in the sense clause (ii) requires, since a dated record of a performance does not lose its discriminating force as it ages, while the allocative attributes of a performer characteristically do. And the arrangement is costly: maintaining a small venue, frequent performance and direct meeting consumes resources that a distribution-only arrangement does not, which is the form the trade-off of §9 takes

at this site.

Two overreadings are excluded. The case establishes that the condition is satisfiable and establishes nothing about whether any actual formation of this kind is well conducted, fairly organised, or free of the hierarchies that §11.8 records such records as developing. And the case supplies no measurement; it identifies an arrangement whose structure the account predicts to behave differently, and the measurement described at §13.2 remains undone.

### *11.8 Overreadings of the site material excluded*

Three exclusions apply to this Part.

The four sites are constructed and are marked as constructed. None reports a measurement, the parameters of §11.5 are illustrative in the sense fixed at §7, and no claim is made about the actual range distributions obtaining at any site.

The gradient identified at each site is a gradient in the composition of available evidence and never a gradient in accuracy, competence or good faith. Every evaluator in this Part is stipulated to be sincere and diligent, and the results are obtained under that stipulation.

The carrier results license no recommendation about any particular institution. Clause (ii) in particular identifies a structural property of durable public contribution records and supplies no ground for holding that any existing record of that kind is well designed, fairly maintained, or free of the hierarchies that such records are known to develop. Part V

## The Boundaries of the Account

## 12 Positions Declined and the Grounds for Declining Them

This section argues the four declinations announced at §2. Its objective is to show that each is a position taken on grounds and no evasion, and its method is to state for each what the paper would have to establish in order to assert the contrary, and why that is unavailable. The section closes with the one declination whose ground is temporal in place of principled.

### *12.1 Grounds for declining a ranking between the two modes*

An account that established a legibility asymmetry and then ranked the modes would have supplied an ordering the asymmetry does not contain. Proposition 6.1 concerns the composition of an evidence set. It supplies no measure on which a generative holding exceeds an allocative one, and it is consistent with the reader who holds that transferable holdings are the ones that matter, since such a reader will read the result as a finding that distant evaluation performs well.

The declination has a further use. A ranking would convert the account into a partisan claim on behalf of one class of holder, and the result would then stand or fall with that claim. Kept separate, the structural result survives disagreement about the ranking and is available to parties on both sides of it.

### *12.2 Grounds for declining a criterion of justice*

To assert that a legibility failure wrongs anyone, the account would need a criterion distinguishing losses that constitute wrongs from losses that are the ordinary price of representation. It holds no such criterion, and the reason is that supplying one requires settling a prior question: whether a representational loss becomes a wrong through its magnitude, through its distribution, through the availability of a remedy, or through some further feature. That question is the subject of the companion paper of this series, and the treatment there proceeds by way of a condition on the recoverability of the destroyed distinction. Anticipating it here would state a conclusion without its argument.

The declination is consequential and should be read as a restriction on what has been shown. Nothing in this paper establishes that any party has been wronged.

### *12.3 Grounds for declining a quantity to be maximised*

The account recommends no maximisation of visibility, of recorded contribution, or of generativity. Three reasons apply, and the third is the one that carries.

The first is internal. Proposition 11.1 shows that the effect of a carrier depends on its durability relative to the artefacts it competes with, so a recommendation stated in terms of coverage alone would be false on the account's own model.

The second is empirical. Recording capacity has expanded enormously without producing a corresponding expansion of recognition, and the settings in which contribution is most exhaustively recorded are not the settings in which it is most fully acknowledged. A maximisation recommendation is therefore not supported by the historical record of what increased recording has in fact produced.

The third is a matter of principle and holds independently of the other two. An objective function over any of these quantities aggregates across the parties it ranges over, and an aggregate permits a shortfall borne by one party to be offset by a surplus held by another. The framework within which this paper sits forbids that offsetting, and it forbids it under every substitution of the maximand, generativity included. A quantity to be maximised is therefore excluded by the same argument whatever quantity is proposed, and the exclusion is not a scruple about measurement.

### *12.4 Grounds for declining an infrastructure design*

This declination differs from the other three, since its ground is the present state of technical, legal and institutional conditions and not a matter of principle.

What the account would need in order to specify a carrier of the kind described at §11.5 is a set of conditions that cannot presently be met together: a representation of a generative act that is durable and portable, that is held by the party who performed the act in place of the platform that recorded it, that confers standing without becoming a surveillance record, and that resists the concentration into hierarchy that contribution records are observed to develop. Each of these is a research programme. The last is the most difficult, since it is a property of the social use of a record and no property of the record itself.

The condition of the account is therefore that a design problem has been identified and no design offered. The reasoning that supports this position is Wanhong's own and is worth stating in his terms: a society can institutionalise only what its technological, legal and economic conditions make feasible, so that a proposal advanced in the absence of those conditions describes a hope in the grammar of a solution. The claim entered here is that the design problem is now stated precisely enough that its conditions can be recognised when they arrive.

## 13 Limits of the Account and Directions for Further Work

This section states what remains unsettled. Its objective is to place the account's weaknesses on the record in a form a critic can use, and its method is to distinguish limits internal to the argument from limits on its evidential base and limits arising from its origin. The section closes with the three directions the account leaves open.

### *13.1 Limits internal to the argument*

The result is conditional and the condition is substantive. Proposition 6.1(i) holds under the hazard-rate order, and Proposition 6.1(iii) shows that the weaker and more natural hypothesis of first-order dominance does not suffice. Every application in Part IV therefore carries an antecedent that the account asserts and does not establish, since determining the range distributions obtaining at a real site would require measurements that have not been made.

The result concerns composition and not accuracy. An evaluator whose evidence set is overwhelmingly allocative may be entirely correct about every item in it, and nothing in the account licenses the inference that distant assessments are mistaken. What the account supports is a claim about what such assessments are assessments of.

The account treats position as one-dimensional. Real evaluative settings involve parties positioned differently with respect to different aspects of the same relation, and a supervisor may stand at zero steps from one part of a worker's contribution and at four from another. A treatment adequate to that would replace the scalar distance of §5 with a structure over aspects, and the present account does not supply one.

### *13.2 Limits on the evidential base*

No measurement is reported in this paper. Both verifications establish the behaviour of $\sigma$ under stated hypotheses on explicitly constructed distributions, and neither estimates a quantity in the world. The parameters were chosen to make the mechanism legible and carry no empirical warrant.

The account is in consequence testable and untested. The form a test would take is determinate: hold a contribution fixed, vary the position of the assessing party, and compare the composition of the material each party can supply in support of an assessment. The prediction is that the allocative proportion rises with distance under the hazard-rate condition and is capped under a carrier, at the values Table 2 reports for the corresponding parameters.

The one arrangement at which the account's condition is satisfied is treated analytically and is constructed. §11.7 exhibits a formation in which co-presence is deliberately produced at scale and durable participation records are maintained, which establishes that the conditions the account describes are satisfiable and that satisfying them is not free. What the treatment does not establish is the cost. No formation of the kind was measured, the resources such an arrangement consumes are stated qualitatively, and whether the arrangement is affordable at a given scale is therefore open. A critic should press that question before any other, since an account whose conditions are satisfiable only at prohibitive cost has established less than it appears to.

The carrier results in particular have an adversarial reading the account cannot presently answer. Where a durable contribution record exists, its maintenance is itself work of the generative kind, and the parties who perform it are observed to receive obligation in place of recognition. A theory that recommends durable records therefore recommends a device whose own upkeep instantiates the problem the theory describes. This is a genuine regress and is recorded here without resolution.

### *13.3 Limits arising from the origin of the account*

The framework within which this paper sits originated in a sequence of personal decisions whose outcomes were favourable, and §2 recorded the discipline that follows. The limit is stated here in full because it bears on how the account may be used.

A trajectory that succeeded confirms a thesis about generative trajectories only in virtue of having succeeded. The population of trajectories that began in the same way and produced nothing is invisible, and it is invisible by the mechanism this paper describes, since a generative process that terminated left no artefact. The account therefore possesses no base rate, and it must not be read as establishing that small beginnings characteristically produce large trajectories. What it establishes concerns the evidence available to an evaluator, and that result is symmetric between trajectories that flourished and trajectories that failed.

### 13.4 Directions the account leaves open

Three directions follow from the limits above.

The first is the measurement described at §13.2, which is the shortest route from the present account to an empirical claim.

The second is the structure over aspects described at §13.1, which would replace scalar distance with a representation of partial participation and would allow the common case in which one party is close to some of a relation and distant from the rest.

The third is the normative question this paper declines. The account establishes that evaluative regimes lose a determinate kind of material and that the loss is systematic. The question of when such a loss constitutes an injustice, and of what a party may claim on the strength of it, is the subject of the companion paper, and the present result is offered as its diagnostic ground.

## References


[Arrow & Fisher (1974)] Arrow, Kenneth J., and Anthony C. Fisher. "Environmental Preservation, Uncertainty, and Irreversibility." *The Quarterly Journal of Economics* 88(2), May 1974, 312–319. DOI 10.2307/1883074.

[Batterman (2002)] Batterman, Robert W. *The Devil in the Details: Asymptotic Reasoning in Explanation, Reduction, and Emergence*. Oxford: Oxford University Press, 2002.

[Bowker & Star (1999)] Bowker, Geoffrey C., and Susan Leigh Star. *Sorting Things Out: Classification and Its Consequences*. Cambridge, MA: MIT Press, 1999.

[Eglash (2016)] Eglash, Ron. "An Introduction to Generative Justice." *Teknokultura* 13(2), 2016, 369–404. DOI 10.5209/rev_TEKN.2016.v13.n2.52847.

[Espeland & Sauder (2007)] Espeland, Wendy Nelson, and Michael Sauder. "Rankings and Reactivity: How Public Measures Recreate Social Worlds." *American Journal of Sociology* 113(1), 2007, 1–40. DOI 10.1086/517897.

[Espeland & Stevens (1998)] Espeland, Wendy Nelson, and Mitchell L. Stevens. "Commensuration as a Social Process." *Annual Review of Sociology* 24, 1998, 313–343. DOI 10.1146/annurev.soc.24.1.313.

[Fourcade & Healy (2013)] Fourcade, Marion, and Kieran Healy. "Classification Situations: Life-Chances in the Neoliberal Era." *Accounting, Organizations and Society* 38(8), 2013, 559–572. DOI 10.1016/j.aos.2013.11.002.

[Hacking (1995)] Hacking, Ian. "The Looping Effects of Human Kinds." In Dan Sperber, David Premack and Ann James Premack (eds), *Causal Cognition: A Multidisciplinary Debate*. Oxford: Clarendon Press, 1995, 351–383. DOI 10.1093/acprof:oso/9780198524021.003.0012.

[Merry (2016)] Merry, Sally Engle. *The Seductions of Quantification: Measuring Human Rights, Gender Violence, and Sex Trafficking*. Chicago: University of Chicago Press, 2016.

[Muller (2018)] Muller, Jerry Z. *The Tyranny of Metrics*. Princeton: Princeton University Press, 2018.

[Polanyi (1966)] Polanyi, Michael. *The Tacit Dimension*. Garden City, NY: Doubleday, 1966.

[Power (1997)] Power, Michael. *The Audit Society: Rituals of Verification*. Oxford: Oxford University Press, 1997.

[Porter (1995)] Porter, Theodore M. *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life*. Princeton: Princeton University Press, 1995.

[Scott (1998)] Scott, James C. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven: Yale University Press, 1998.

[Spence (1973)] Spence, Michael. "Job Market Signaling." *The Quarterly Journal of Economics* 87(3), August 1973, 355–374.

[Star & Strauss (1999)] Star, Susan Leigh, and Anselm Strauss. "Layers of Silence, Arenas of Voice: The Ecology of Visible and Invisible Work." *Computer Supported Cooperative Work* 8(1–2), 1999, 9–30. DOI 10.1023/A:1008651105359.

[Cover & Thomas (2006)] Cover, Thomas M., and Joy A. Thomas. *Elements of Information Theory*, 2nd edn. Hoboken: Wiley-Interscience, 2006.

[Fisher & Hanemann (1987)] Fisher, Anthony C., and W. Michael Hanemann. "Quasi-Option Value: Some Misconceptions Dispelled." *Journal of Environmental Economics and Management* 14(2), June 1987, 183–190.

[Henry (1974)] Henry, Claude. "Option Values in the Economics of Irreplaceable Assets." *The Review of Economic Studies* 41(5), 1974, 89–104.

[Hayek (1945)] Hayek, F. A. "The Use of Knowledge in Society." *The American Economic Review* 35(4), September 1945, 519–530.

[Holmström & Milgrom (1991)] Holmström, Bengt, and Paul Milgrom. "Multitask Principal-Agent Analyses: Incentive Contracts, Asset Ownership, and Job Design." *Journal of Law, Economics, and Organization* 7 (special issue), 1991, 24–52.

[Marx (1975)] Marx, Karl. "Economic and Philosophic Manuscripts of 1844." In *Karl Marx and Frederick Engels: Collected Works*, vol. 3. London: Lawrence & Wishart, 1975, 229–346.

[Mensink & Requate (2005)] Mensink, Paul, and Till Requate. "The Dixit–Pindyck and the Arrow–Fisher–Hanemann–Henry Option Values Are Not Equivalent: A Note on Fisher (2000)." *Resource and Energy Economics* 27(1), January 2005, 83–88.

[Shannon (1959)] Shannon, Claude E. "Coding Theorems for a Discrete Source with a Fidelity Criterion." *IRE National Convention Record* 7, part 4, 1959, 142–163.

[Tishby, Pereira & Bialek (1999)] Tishby, Naftali, Fernando C. Pereira, and William Bialek. "The Information Bottleneck Method." In *Proceedings of the 37th Annual Allerton Conference on Communication, Control and Computing*, 1999, 368–377. arXiv:physics/0004057.

[Waring (1988)] Waring, Marilyn. *If Women Counted: A New Feminist Economics*. San Francisco: Harper & Row, 1988.