

Problems in Dealing with Problems: How Breakdowns in Corrective Culture Lead to Institutional Failure

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Although research investigating how organizational culture contributes to institutional failure has extensively conceptualized the causal factors (e.g. norms for behaving unsafely), how culture prevents such problems from being corrected is less well theorized. We synthesize theory on accidents, resilience and reliability and organizational learning to develop a conceptual model of ‘corrective culture’. This relates to distributed norms and behaviours for three interconnected elements: the detection of problems (‘identification’), appreciation of their meaning (‘interpretation’) and responses to prevent harm (‘action’). To investigate the model, and its role in institutional failure, we combined natural language processing and qualitative analysis to examine 54 UK public inquiries published during 1990–2020. Our mixed-methods analysis found that distributed malfunctions in identifying, interpreting and acting on problems cause a breakdown in organizations’ ‘corrective loops’, which enables originating problems to compound and grow (e.g. risky, unsafe or poor conduct) and cause an institutional failure. We theorize that double-loop learning is required to prevent this, whereby strong and unambiguous feedback compels organizations to acknowledge and address their *problems in dealing with problems*, thus enabling them to correctly identify, interpret and act on originating issues and thus prevent a spiral into failure.

An error doesn’t become a mistake until you refuse to correct it¹

(President John F. Kennedy, 1961)

Introduction

Inquiries into institutional failures often pose the following question: *How could this have been allowed to happen?* Problems were allowed to persist and cascade. Examples include the failures to identify systemically poor and unsafe standards of care in Stafford Hospital, which contributed to adverse incidents and deaths over 4 years, or by Boeing to address technical flaws in the 737 Max aircraft that caused two plane crashes. Such cases typify institutional failure, which is a ‘nega-

tive or undesired’ institutional-level event where, due to ‘a combination of errors, violations, risks, and chance factors’, there is systemic activity that is erroneous or contrary to the goals and purpose of the institution, and leads to significant harm (Lei, Naveh and Novikov, 2016, p. 1317). Oftentimes, institutional failures involve accidents or scandals, with the term ‘institutional’ reflecting the systemic and distributed nature of incidents: for example, in healthcare, where institutional failures (e.g. deaths from unsafe surgery over many years) have occurred due to repeated errors distributed across multiple organizations (e.g. hospitals, ancillary services, regulating bodies) (Kennedy, 2001).

To explain why institutional failures occur, research has focused on the role of organizational culture, especially norms and behaviours relating to safety and ethical conduct. Yet, a recent systematic review suggested that there is a common, yet less well understood, cultural feature of these failures: ‘corrective culture’. This refers to collective norms and behaviours within organizations for correcting problems that, if not fixed, will

¹President Kennedy was quoting Orlando Aloysius Battista in a speech to the American Newspaper Publishers Association, 27 April 1961.

worsen and cause harm (Hald, Gillespie and Reader, 2021). Where organizations develop malfunctions in their corrective culture (e.g. having tendencies to miss or ignore issues) they have, in effect, a *problem in dealing with problems*, and this increases the risk of failure due to hazards going unresolved. Yet, at present, a parsimonious, theorized and evidence-based model of corrective culture, and its role in institutional failures, is lacking.

In the current paper, we advance theory and research on corrective culture by integrating it with key literatures. Specifically, we draw on research on resilience and high-reliability organizations (HROs) (Hollnagel, 2009; Weick and Sutcliffe, 2007) to conceptualize corrective culture as being comprised of norms and behaviours for three core activities: detecting problems ('identification'), understanding their significance ('interpretation') and taking corrective action ('action'). Moreover, drawing upon double-loop learning theory (Argyris, 1990), we conceptualize these norms and behaviours to guide and operate a widespread, oft-recurring and distributed corrective loop that can prevent or enable problems to cascade, worsen and cause institutional failure. We develop, test and refine this model through a mixed-methods design that uses natural language processing (NLP)² to guide a quantitative and qualitative analysis of 54 public inquiry reports undertaken in the United Kingdom since 1990. These are government-initiated investigations into major institutional failures, and we draw upon recent advances in NLP to try and leverage the collective insight they contain. The goal is to develop and establish the proposed corrective culture model and examine whether it is a common feature within diverse failures investigated by the public inquiry reports.

Literature review

The outcomes of institutional failures vary considerably: for instance, the penalization, restructuring or dissolution of organizations. To understand how such outcomes can be prevented (e.g. in industries or public services) and why they occur, research has extensively investigated the causes of institutional failures and considered the role of culture in explaining the systemic problems that cause incidents (Turner and Pidgeon, 1997).

Organizational culture relates to the artefacts (e.g. language, rules), espoused values (stated priorities and

goals) and underlying assumptions (unconscious and implicit beliefs) within an organization (Schein, 1984). Reflecting its multidisciplinary origins and different levels of analysis (e.g. group, institution), research on organizational culture is highly diverse: for example, incorporating quantitative studies of the norms shared by members and qualitative investigations of how culture manifests in day-to-day work (e.g. Catino and Patriotta, 2013; Guldenmund, 2000; Jahoda, 2012; Kaptein, 2011; Reader *et al.*, 2020). This work attempts to explain institutional outcomes by both identifying the values and norms that foster certain types of behaviour (e.g. safety activities) (Chatman and O'Reilly, 2016; Guldenmund, 2007) and accounting for the mechanisms by which assumptions and practices are developed, enacted and shared (e.g. via story-telling, leadership or language) (Amernic and Craig, 2017; Srivastava *et al.*, 2018; Weick, 1987). Whilst organizational culture is often described as homogenous, it can be fractured and diverse (e.g. varying by group) and shaped by internal and external drivers (Martin, 1992).

Scholars have long used culture as an analytical framework for understanding institutional failures, developing models such as 'safety culture', 'ethical culture' and 'risk culture' to explain the norms and behaviours (e.g. rule violations, fraud) that cause major accidents and scandals (e.g. Bisbey *et al.*, 2021; Ghafoori *et al.*, 2023; Guldenmund, 2000; Kish-Gephart, Harrison and Treviño, 2010). Whilst such models are often domain-specific, explaining the context of behaviours that caused incidents (e.g. unsafe behaviour in healthcare, fraud in banking), recent research has observed that institutional failures often have generic cultural features.

In a systematic review of institutional failures across sectors, Hald, Gillespie and Reader (2021) noted that whilst incidents can have diverse causal cultural factors (e.g. around priorities for safety, ethics, risk and professionalism), a common contributory factor is a cultural *problem in dealing with problems*. This is labelled 'corrective culture' and refers to the cultural features of organizations that stop behavioural problems from being corrected, which allows them to cascade and grow in severity until they culminate in an institutional failure (e.g. a major accident). An example is the UK Mid Staffordshire hospital scandal, where cultural misfunctions around silencing and suppressing safety data, defensiveness to complaints and tendencies to hide problems meant that patient safety failures went unchecked and caused widespread harm (Macrae, 2014; Reader, 2022). Hald and colleagues identify eight aspects of a poor 'corrective culture': an acceptance of risk; communication from management that normalizes problems; silence about problems; inaction; inadequate action; lacking procedures to raise incidents; bullying; and lack of learning. However, whilst these aspects shed light on the cultural processes that prevent institutions from

²NLP describes the computational quantification of qualitative textual data (e.g. reports, speech). It uses artificial intelligence (AI) to establish and investigate patterns of words and phrases that are theorized or shown to pertain to a concept within text. This both measures the presence of a concept within textual data and surfaces statements for closer examination. NLP is increasingly used to analyse organizational culture, with textual data conceptualized as an artefact revealing of norms and behaviours (e.g. Pandey and Pandey, 2019).

correcting problems, a coherent model of corrective culture and its relationship with institutional failures is lacking.

Developing a dynamic model of corrective culture

To develop the model of corrective culture, we refer to literature on organizational accidents (Reason, 1998; Turner and Pidgeon, 1997), resilience and HRO theory (Hollnagel, 2009; Weick and Sutcliffe, 2007) and organizational learning (Argyris, 1990). We suppose this literature to be useful because it has studied and theorized the processes required in organizations to manage hazards and threats and prevent institutional failures.

First, research on organizational accidents (e.g. Reason, 2000; Turner and Pidgeon, 1997) provides a high-level explanation of how, in combination, the eight aspects of corrective culture identified by Hald, Gillespie and Reader (2021) combine to cause institutional failures. Namely, errors, threats and hazards are always present within high-risk organizations, and cultural factors that inhibit processes for dealing with these (e.g. ‘unwillingness to deal proactively with known deficiencies’; Reason, 1998, p. 297) both stop their resolution and enable problems to incubate and develop into accidents. We extend this idea beyond safety, and theorize that malfunctions in corrective culture can lead to failures in any domain where there is activity that is erroneous or contrary to institutional aims. This is because corrective culture not only hinders the resolution of problems, but enables them to escalate and grow.

Second, to conceptualize corrective culture as a set of parsimonious elements, the literature on resilience engineering and HRO theory is instructive (Hollnagel, 2009; Roberts, 1990; Weick and Sutcliffe, 2007). Resilience engineering examines organizational processes for identifying and resolving threats (Pettersen and Schulman, 2019; Rankin *et al.*, 2014) and HRO theory examines the ‘collective mindfulness’ (e.g. being preoccupied with failure) needed to share, interpret, frame and make sense of information on risk (Fraher, Branicki and Grint, 2017; Weick and Sutcliffe, 2007).³ Drawing upon this literature, we theorize corrective culture to consist of three

³Research on resilience and reliability has distinct origins (see Le Coze, 2019). Reliability theory emerged in the 1980s and focuses on how hazards in high-risk domains (e.g. nuclear power, oil and gas, air traffic control) are prevented and controlled, with organizations needing ‘collective mindfulness’ (e.g. sharing and making sense of signals indicative of risk) to avoid failures (Weick and Sutcliffe, 2007). Resilience theory, which has become prominent in recent years, is used to understand how organizations adapt to disruptions (e.g. in healthcare systems, crisis management) and theorizes the capabilities needed for successfully managing and recovering from these (e.g. identifying and responding to problems; Hollnagel, 2009). Research on both

interdependent and mutually reinforcing elements: identification, interpretation and action.

Identification. Research on HROs and resilience emphasizes the importance of organizational processes for surfacing risks and hazards. In particular, alertness and vigilance to risks (Vogus and Sutcliffe, 2007), preoccupation with potential failure (Weick and Sutcliffe, 2007) and speaking up when problems arise (Edmondson, 2018) ensure problems are identified before they become severe. Conversely, collective tendencies that diminish the capability of organizations to identify problems – for example, ignoring or not reporting hazards (Turner and Pidgeon, 1997), normalizing performance disruptions (Entwistle and Doering, 2024; Pettersen and Schulman, 2019) or reluctance to voice concerns (Noort, Reader and Gillespie, 2019; Vaughan, 1996) – can mean problems go undetected and thus are not addressed. Therefore, in conceptualizing corrective culture, we theorize the first element to be ‘identification’: norms and behaviours for surfacing and recognizing problems in organizations.

Interpretation. HRO theory also focuses on sense-making: how people ‘extract cues and make plausible sense retrospectively, whilst enacting more or less order into those ongoing circumstances’ (Weick, Sutcliffe and Obstfeld, 2005, p. 409). Through processes for interpreting problems – for instance, investigations into the causes of near misses (Macrae, 2009), analysing warning signs (Callari *et al.*, 2019) or drawing insight from ‘soft data’ (e.g. complaints; Martin, McKee and Dixon-Woods, 2015) – performance issues become understood and manageable. In contrast, where interpretive processes malfunction, problems go misunderstood and unaddressed: for example, due to organizational proclivities for defensiveness and scapegoating when errors occur (Gillespie, 2020; Westrum, 2004), simplifying or explaining away of data indicating risk (Dixon-Woods *et al.*, 2009; Turner and Pidgeon, 1997) or confirming rather than disconfirming assumptions (Weick and Sutcliffe, 2003). Thus, we propose the second element of the corrective culture model to be ‘interpretation’: norms and behaviours in organizations for analysing and understanding the nature and significance of problems.

Action. Key to resilience and HRO theory is that, once problems have been identified and interpreted, effective steps to prevent or ameliorate harm follow (Hollnagel, 2009; Weick and Sutcliffe, 2007). Depending on the context, action can take forms such as

uses diverse methods (e.g. ethnography, surveys), is multidisciplinary (e.g. including organizational psychology, sociology, engineering) and distinctive due to a common interest in explaining how, despite operating in inherently risky domains, organizations continuously ensure that hazards and disruptions are successfully managed and prevented from causing severe breakdowns.

proactively resolving emerging hazards (Flin, O'Connor and Crichton, 2008), 'stopping the line' until problems are fixed (Atkins *et al.*, 2011), restructuring teams and changing leaders (Grote, 2019), refocusing decision-making (Crichton, Ramsay and Kelly, 2009) or changing priorities and goals (Faraj and Xiao, 2006). Where action is absent or ineffective – for instance, due to tendencies for inertia (Alison *et al.*, 2015), unwillingness to challenge protocols (McCall and Pruchnicki, 2017), inflexibility in adapting strategies (Zighan, 2023), poor teamwork (Salas *et al.*, 2020) and excluding different viewpoints (Edmondson, 2018) – problems are less likely to be successfully addressed. Consequently, we theorize the final element of the corrective culture to be 'action': norms and behaviours in organizations for ensuring problems are effectively resolved.

Finally, to conceptualize how identification, interpretation and action combine and contribute to institutional failures, we use double-loop learning theory. Classical models of learning emphasize that people resolve problems through 'reflection-in-action' (Schön, 1983), whereby they continuously gather and interpret feedback to update their representation of the problem (Argyris, 1990; Bateson, 1972). Learning about the problem is termed single-loop, whilst learning about the process of addressing the problem is termed double-loop. In double-loop learning, actors not only adapt their behaviour for managing a problem (e.g. single-loop error correction), but recognize and address shortfalls in their strategies for resolving problems (Argyris, 1977). Corrective culture is critical to this process because norms and behaviours for identification, interpretation and action support collective activity for surfacing problems, updating representations and creating actionable strategies.

We term this process the 'corrective loop' and suppose that breakdowns within it, caused by malfunctions in corrective culture, can lead to failures in both single-loop learning (correcting problems) and double-loop learning (correcting problems in dealing with problems). Breakdowns in the corrective loop mean not only that problems go unresolved, but also that further feedback (e.g. on problem recurrence or evolution) may not be learnt from (Argyris, 1990; Dahlin, Chuang and Roulet, 2018; Lei and Naveh, 2023). The corrective loop is a dynamic theorization of corrective culture, whereby the three elements of identification, interpretation and action are interdependent and work together to prevent failure. Where there are problems in corrective culture (e.g. norms for denial), this can cause systemic breakdowns in the corrective loops needed to resolve threats and hazards, thus allowing them to amplify and worsen until they can only be addressed once an unambiguous institutional failure has occurred (Turner, 1994; Turner and Pidgeon, 1997).

The current study

We explore and develop the proposed model of corrective culture through a mixed-methods analysis of 54 public inquiry reports⁴ into major institutional failures in the United Kingdom between 1990 and 2017. We suppose public inquiries to be a useful starting point for investigating the corrective culture model because they contain vast information on some of the most serious institutional failures in recent UK history. Because public inquiries are undertaken to a standard and scale not possible in most academic research – for instance, being independently conducted, with unrivalled data access and exhaustive reporting requirements – they provide a highly rigorous dataset. Moreover, given the diversity of contexts investigated (e.g. healthcare, transport and financial services), they can enable investigation of whether corrective culture applies to different failure types and sectors.

There is a practical impetus to investigate public inquiries because, despite their cost and rigour, they can have minimal impact (Stark, 2018). Their potential is rarely achieved (McAllister *et al.*, 2023) and lessons go unlearned (Norris and Shephard, 2017). But the data remaining post-inquiry, once the politics have died down, can provide a valuable resource for researchers (e.g. Weick and Sutcliffe, 2003). Accordingly, to help deliver on their potential (and by studying corrective culture), we aim to identify common threads in the causes of failure documented in public inquiry reports.

However, the sheer volume of public inquiry data presents a major challenge for research. On the one hand, reports are too voluminous to analyse in-depth (running to thousands of pages), yet, on the other hand, the specificity and peculiarity of each failing require in-depth analysis. To address this challenge, we use an innovative mixed-methods approach that combines NLP with in-depth qualitative analysis. Although it has been argued that qualitative and quantitative paradigms are incommensurable (Bryman, 2008), there is a growing acknowledgement that mixing these methods can enhance

⁴Public inquiries relate to government-initiated investigations into the cause of an institutional failure. Between 1990 and 2017 there have been 68 public inquiries in the United Kingdom (Norris and Shephard, 2017). These include serious failures in public institutions (e.g. healthcare, policing, social services) and also private organizations (e.g. oil companies, banks, food companies), where public institutions have been implicated in incidents (e.g. regulators). Public inquiries are ordered by government, and therefore can examine large amounts of primary evidence, may have statutory powers to receive evidence from all relevant witnesses and are undertaken by independent teams (e.g. lawyers, judges). Because oftentimes it is public institutions being investigated, these cannot be dissolved (e.g. government organizations), and the focus is on learning and preventing recurrences. Where private organizations are investigated, these may have been closed and inquiries consider lessons for industry and regulation.

research quality (Guetterman *et al.*, 2018) and is necessary for large qualitative datasets, which can enable synergies between these diverse approaches (Davidson *et al.*, 2019; Gillespie, Glăveanu and de Saint Laurent, 2024). Thus, to investigate the public inquiry dataset, we use NLP to obtain high-reliability measures of corrective culture, test theoretical assumptions and identify segments of text to analyse qualitatively. Then, to generate insight and look beyond word patterns, we qualitatively ‘zoom in’ on textual excerpts to illustrate findings, challenge quantitative patterns and abductively generate insights on corrective culture. By using recent advances in recursive quantitative–qualitative analysis techniques (Creswell and Creswell, 2018), and leveraging synergies between NLP and qualitative methods (Chang *et al.*, 2021; Ho *et al.*, 2021), we address the high-validity, but also high-volume, public inquiry data. Four research questions (RQs) were addressed.

First, we developed and applied an NLP methodology to establish the prevalence of the corrective culture elements (identification, interpretation and action) in the public inquiries, and how they manifested in failures (RQ1). By measuring the degree to which inquiries used language indicative of corrective culture, and then qualitatively analysing high-relevance statements (i.e. classified by an NLP algorithm), we aimed to generate initial support for the model.

Second, we examined how the three corrective culture elements related to one another and contributed to reported failures (RQ2). We conducted case study analyses of a subset of public inquiries ($n = 16$) that, within their terms of reference, focused specifically on understanding failures to correct problems. Guided by NLP, we aimed to explore interdependencies between the corrective culture elements and examine how they interact to determine how problems were addressed prior to failures.

Third, we explored how malfunctions in corrective culture led to breakdowns in the corrective loop for responding to problems and contributed to institutional failures (RQ3). Focusing on two cases, and supported by NLP, we investigated how and whether breakdowns in the corrective loop led to problems not only going unresolved, but also worsening. We aimed to theorize how corrective culture might influence the trajectory of incidents and limit the single-loop and double-loop learning needed to resolve problems and prevent incidents.

Finally, we examined whether the public inquiries themselves identified corrective culture (using their own terminology) as a contributory factor in failures (RQ4). A risk in developing any conceptual model, particularly when based on a subset of cases or textual elements, is failing to challenge assumptions (Morse, 2010). We addressed this by considering again the whole sample of inquiries and, guided by NLP, examining whether the

Chair(s) who led the inquiry surmised corrective culture to underlie incidents. Where they did not, we examined why and how this challenged, undercut or advanced the model.

Methods

Data collection and preparation

We obtained 54 of the 68 post-1990 public inquiry reports identified by Norris and Shephard (2017) that were available digitally ($n = 23,314,806$ words): see Appendix 1. Given the volume and richness of the data, we used a recursive mixed-methods approach (Gillespie, Glăveanu and de Saint Laurent, 2024). NLP was used to measure corrective culture, test assumptions and identify textual segments to analyse qualitatively. Qualitative analysis examined surfaced text in order to illustrate and explain findings, challenge quantitative patterns and iterate the model. This synergistic mixed-methods approach was used across the four research questions: we describe the procedures used below, and their application to research questions in Table 1.

Natural language processing

Public inquiries were analysed using the statistical computing programme R (R Core Team, 2020). The goal of the NLP analysis was to measure and identify, across the 23 million words in the inquiries, excerpts of text relating to corrective culture. We theorized that this would provide a reliable way to measure, establish and characterize the elements of corrective culture within inquiries (e.g. by indicating how much, across different reports, they are discussed), and to identify text for qualitative analysis.

Following standard procedures (Feinerer and Hornik, 2020; Feinerer, Hornik and Meyer, 2008; Rinker, 2018), and to standardize the text for NLP analysis, pre-processing involved removing: (1) words with both letters and numbers, proper nouns and special characters (e.g. \$); (2) punctuation, numbers, stopwords (e.g. ‘the’, ‘for’) and one- or two-letter lowercase words; and (3) inflections (e.g. past/present-tensed verbs).

To identify sentences relating to corrective culture, we developed a supervised text classification algorithm. This ‘involves assigning a text document to a set of pre-defined classes automatically, using a machine learning technique’ (Dalal and Zaveri, 2011, p. 37). The text documents were sentences parsed from the reports using the *quanteda* package for NLP (Benoit *et al.*, 2018). A dictionary of 94⁵ keywords relating to corrective culture

⁵Drawing on procedures outlined by Pennebaker *et al.* (2007), we built this dictionary (i.e. list of keywords) to identify a sample of sentences relevant to corrective culture.

Table 1. Analysis for each research question

Research question	NLP	Qualitative
RQ1: Prevalence and manifestation of corrective culture	Applying the text classifier to all inquiries to reveal the proportion of sentences relating to corrective culture and the discreteness of identification, interpretation and action elements. The 500 sentences most indicative of each cultural element (n = 1500) and 10 highest for each report (n = 539) were identified.	The highest-scoring sentences, by element and report, were deductively analysed for consistency with corrective culture. We then inductively explored how the elements of corrective culture were described (e.g. behaviours, alone or with other elements). This validated and challenged the text classifier and revealed how cultural problems in identification, interpretation and action manifested.
RQ2: Interaction between the elements of corrective culture	Analysed the 16 inquiries in which the terms of reference focused on problems in dealing with problems using the text classifier. The text identified by the classifier was used to identify excerpts connecting identification, interpretation and action, and thus reliably bootstrap the qualitative analysis.	Starting with the textual excerpts identified by the classifier, problems in identification, interpretation and action were inductively analysed. The analysis examined the text in its narrative context and considered similarities and differences between reports. Prototypical and atypical examples were identified to prompt abductive theorizing.
RQ3: How breakdowns in the corrective culture loop dynamically contribute to institutional failures	Focusing on two inquiries, selected from the 16 in RQ2 for being situated in different contexts and pertaining to different forms of institutional failure, the text classifier identified all statements pertaining to the three elements of corrective culture. These were used to support, but not guide, the analysis of how breakdowns in the corrective culture loop contributed to failure.	Both inquiries were examined, with the NLP identifying supplementary excerpts missed in the reading. The analysis inductively traced how problems in identification, interpretation and action were distributed, recurred, shaped the problem, hindered double-loop learning and contributed to failures. The analysis focused on differences to abductively challenge and develop the model.
RQ4: Evaluating the model by examining the chair(s)' conclusions on corrective culture	Using the text classifier, and applying it to all 54 public inquiries, the 200 sentences scored as being most relevant to all three corrective culture elements were identified and surfaced. Sentences were inspected, crossing between the NLP and the reports, to identify if they were written as a summary or conclusion by the Chair(s) leading the inquiry.	Summary and concluding statements were deductively analysed in terms of whether they referred to some form of corrective culture. Each report was categorized as: (i) recognizing the entire model; (ii) recognizing two or three linking elements; or (iii) not featuring the model. To challenge the model, we abductively focused on summary and concluding statements not mentioning corrective culture and examined the reasons for this.

was used to identify candidate sentences (n = 292 for identification; n = 302 for interpretation; n = 592 for action; n = 1175 randomly selected non-relevant sentences), which were manually coded and selected sentences were then used to train the text classifier: see Appendix 2.⁶ In *quanteda* (Benoit et al., 2018) and *glmnet* (Friedman, Hastie and Tibshirani, 2010), a regularized regression model was applied. Overall, the classifier performed well and was applied to all 54 reports (n = 630,875 sentences) so that all relevant sentences relating to corrective culture could be extracted: see Appendices 3 and 4.⁷

⁶In plain terms, this means that the classifier was programmed to use the example set of sentences relating to identification, interpretation and action to find, through scoring all sentences within the inquiries in terms of whether they used similar words and formations to the training set, further sentences relating to corrective culture. Sentences were scaled in terms of their similarity to the training set (indicating the most 'high-relevance' sentences) and performance of the classifier was checked through a regularized regression, which found it to perform well (F1-identification = 0.86, F1-interpretation = 0.91, F1-action = 0.88).

⁷The model was assessed using the *caret* package (Kuhn, 2020).

Qualitative analysis

Text identified through the NLP analysis relating to corrective culture, and also identified through reading the inquiries, was qualitatively analysed. This qualitative methodology had deductive, inductive and abductive elements.

RQ1 and RQ2 were led by the lead author, supported by co-authors; RQ3 was undertaken collaboratively to avoid a limiting narrative account; and RQ4 was led by a co-author to ensure a fresh perspective. Analyses were undertaken in the original PDFs, which were cross-referenced with the NLP output. These analyses moved through a combination of deductive, inductive and abductive theorizing (see Table 1).

Deductive analysis followed content analysis methodology (Hsieh and Shannon, 2005), with the nature and context of sentences being explored and analysed in terms of their relationship to the elements (e.g. excerpts about *action* related to norms and behaviours for addressing problems). In practice, this involved systematically sampling, reading, re-reading, comparing and interpreting sentences identified by the algorithm or identified through readings of the reports against the proposed model, with text segments being highlighted and annotated, labelled and sorted in Excel.

Inductively, we overlapped the coded NLP text with further data collection and analysis that situated it within the wider context (i.e. the inquiry) so as to derive deeper meaning. We followed Shepherd and Sutcliffe's (2011) guidance on inductive top-down theorizing. This is where a broad idea is outlined, informed by existing literature – in order to develop a coherent structure of interest (i.e. corrective culture) – and then iterated through inductive inquiries (e.g. of literature, data) that analyse and compare data to “‘carve out’ paradigms, tensions, oppositions, and contradictions’ that test and challenge ideas, demand further analysis, but do not overcomplicate or narrow originating ideas (Shepherd and Sutcliffe, 2011, p. 367). To do this, we examined textual statements about corrective culture within case narratives, considered commonalities and differences between inquiries, moved between micro- and macro-levels of analyses, examined causes and consequences of problems, unexpected features and recurring elements. Observations (e.g. on corrective loops) were tested through comparing cases to examine whether they were one-offs or commonplace (Eisenhardt, 1989).

For abductive theorizing, we followed Sætre and Van de Ven's (2021) technique. This is a cyclical process of observing anomalies in data, confirming them, generating and evaluating hunches, couching them within theoretical knowledge and following up with further analysis. We remained alert to and noted surprising observations (Tavory and Timmermans, 2014): for example, when comparing public inquiries or examining the statements of Chair(s) (Kaarbo and Beasley, 1999). We were mindful of the limitations of public inquiries, and the need to read beyond individual cases and consider the factors that shape them: for example, hindsight bias, political agendas and a tendency to force complex cases into singular narratives and assert authority (Brown, 2000).

Results

RQ1. Prevalence and manifestation of corrective culture elements in public inquiries

References about corrective culture were widespread in public inquiry reports and evident across all sectors (n = 40,532 sentences): 9745 sentences about identification, 4638 about interpretation and 26,149 about action. On average, 6.42% of sentences pertained to corrective culture (range = 3.48% to 17.99%). Sentences relating to corrective culture varied in prevalence by sector: the most in healthcare (8.44%) and fewest in transport (4.87%). Inductively, variations arose from inquiries focusing on problems relating to one element: for instance, misidentifying multiple warning signs (e.g. Victoria Climbié Inquiry), continual misinterpretations

of problems (e.g. Renewable Heat Incentive Inquiry) or taking little action (e.g. Mid Staffordshire Inquiry).

Having indicated the elements of corrective culture to be salient in the inquiries, we confirmed and explored the manifestations of cultural phenomena relating to identification, interpretation and action: see Table 2 for examples. Text on corrective culture features throughout the inquiries (e.g. witness statements, reporting on institutional data, conclusions), thus providing tentative support for the three corrective culture elements.

Text classified as identification reported people not seeing, detecting, suspecting, realizing or receiving information about problems, which inhibited the surfacing of hazards. For example, in the Victoria Climbié Inquiry, social services repeatedly encountered signs of child abuse, but failed to identify ‘the most extreme ill-treatment (...) over a substantial period of time’ (Laming, 2003, p. 196). Failures of identification occurred due to different factors, including: lack of suitable technology (Phillips, 2000), focus on other problems (Keith, 2006) and not accepting secondary information (Redfern, 2001). Not all texts about the identification of problems related to culture: for instance, some focused on regulation (Cullen, 1990).

Text classified as interpretation related to people not recognizing problem severity, meaning the need for action was not grasped. Interpretation failures were enacted in assumptions or processes that rationalized problems away: for instance, people concluding that performance issues were due to complexity rather than personal abilities (Kennedy, 2001), or that self-regulation was sufficient to deal with misconduct (Pauffley, 2004). Edge cases revealed problems in interpretation could stem from other factors than culture: for instance, errors in reading of data or skill gaps (Bingham, 1992).

Text classified as action yielded information on ineffective, delayed, hedged or absent responses to problems. Inaction arose due to inertia (Pennington, 2009), fear of repercussions (Pleming, 2005), lack of proactivity (Redfern, 2001), confusion on accountabilities (Bingham, 1992) and alternative priorities such as preserving reputation (Kirkup, 2015). At the extremes, counteraction could occur: for example, the Morecambe Bay Investigation described suspected attempts to conceal problems, ‘including the disappearance of key clinical records and the delayed completion of critical notes’ (Kirkup, 2015, p. 19). Action was fuzzier than the other elements (e.g. a failure of action could involve not raising concerns) and could be well-meaning but incorrect (Hart, Lane and Doherty, 2017).

RQ2. Interaction between the elements of corrective culture

We sampled the 16 public inquiries that had an explicit focus on investigating why emerging problems were not

Table 2. Examples of text from the inquiries identified by NLP as indicating manifestation of corrective culture

Element	Quote
Identification	<ul style="list-style-type: none"> • ‘The idea that there was an epidemic of AIDS amongst haemophilia patients was dismissed^a as “ludicrous” (Penrose, 2015, p. 548). • ‘There was a generally “dismissive attitude” displayed in response to the complaint’ (Pleming, 2005, p. 198 [Vol. 1]). • ‘He ought also to have noticed the unusual features of the deaths of Shipman’s patients so that, when these matters were discussed between the partners of the Brooke Practice, he could have contributed his observations’ (Smith, 2002, p. 377 [Third Report]). • ‘Firstly, even some of those closely involved in the discussions about hooding, do not appear to have been aware of the orders banning hooding’ (Gage, 2011, p. 780 [Vol. II]). • ‘He emphasized that MAFF was not “deliberately ignoring problems about the disposal of SBO material” and invited Mr Scott or Mr Howells to discuss any detailed information they might have with MAFF officials’ (Phillips, 2000, p. 292 [Vol. 5]). • ‘The danger was that officials or Ministers, in relying solely on such a brief, might be unaware of such doubts or might overlook them’ (Phillips, 2000, p. 15 [Vol. 15]).
Interpretation	<ul style="list-style-type: none"> • ‘I find it disturbing that an experienced detective could have failed to grasp the simple concept that a doctor who had murdered a patient might wish to avoid an autopsy of the victim’s body’ (Smith, 2002, p. 69 [Second Report]). • ‘We accept, therefore, that bullying by residents was condoned by staff far too often, although it would be inappropriate to single out Leslie Wilson for blame in this respect’ (Waterhouse, 2000, p. 181). • ‘But they did not have the mindset to undertake such analysis, preferring to believe that things would get better’ (Kennedy, 2001, p. 237). • ‘When looked at in its proper context, it shows an institution out of control, where values are inverted, where seriously inappropriate behaviour is accepted, where control and domination is tolerated’ (Pleming, 2005, p. 114). • ‘Mrs Coles was unable to explain how he was doing so and accepted that she had probably only looked at the more recent record without appreciating the contrast’ (Pennington, 2009, p. 138). • ‘(...) it is more important to have a proper system in place to ensure that important information contained within letters from other Departments (such as those from DECC which may have assisted DETI in the exercise of its functions, or caused it to make some further enquiries) is both appreciated and acted upon appropriately’ (Coghlin, O’Brien and MacLean, 2020, p. 150 [Vol. 3]).
Action	<ul style="list-style-type: none"> • ‘The decision not to investigate in 1988, even with some new managers in place, fits comfortably with the decision not to investigate at any time in the past (...)’ (Pleming, 2005, p. 357). • ‘Instead of provoking urgent and more general remedial action, a perception that a deficiency was common has led to a silent acceptance of it’ (Francis, 2013, p. 1367 [Vol. 3]). • ‘There can be no other conclusion than that it was imperative for Mr Butler to investigate and resolve the problem which was so upsetting both parents and a respected consultant’ (Redfern, 2001, p. 165). • ‘But it is possible that there was an opportunity for Kestrel or Swallow to have been warned about Stewart’ (Keith, 2006, p. 208). • ‘He stated that the Commissioner did not, to his knowledge, raise any specific questions’ (Macpherson, 1999, para. 28.48). • ‘It is very important that those responsible for supervising suspect banks should be alert to the possibility of fraud, astute in recognizing signs of it and active in investigating it (or causing it to be investigated)’ (Bingham, 1992, p. 183). • ‘And when he had to investigate a formal complaint of racism, he would try to resolve the complaint informally so that the parties directly affected were satisfied – or at any rate professed to be satisfied – rather than consider whether there was a wider problem underlying the complaint’ (Keith, 2006, p. 424).

See Supporting Information File 1 for further examples.

^a Emboldened terms represent keywords used to identify relevant sentences manually: see Appendix 2.

fixed: see Appendix 5. We reasoned that this targeted sample would facilitate a deeper examination of how the three corrective culture elements interacted. To characterize the inquiries, and consider their different contexts, we grouped them by sector and on two dimensions: the number of people impacted and the number of staff implicated (see Figure 1).

As shown in Figure 1, diverse failures had a similar focus on corrective culture, with inquiries predom-

inantly raising issues around action ($M = 5.17\%$ of sentences, $SD = 0.03$), then identification ($M = 1.74\%$, $SD = 0.005$) and interpretation ($M = 0.84\%$, $SD = 0.005$). Guided by the text classifier, and expanding upon this, we explored how elements interacted in different cases, with a particular focus on similarities and differences between contexts. The goal was to deepen our theorization of corrective culture by identifying the commonly recurring ways in which elements interacted together to

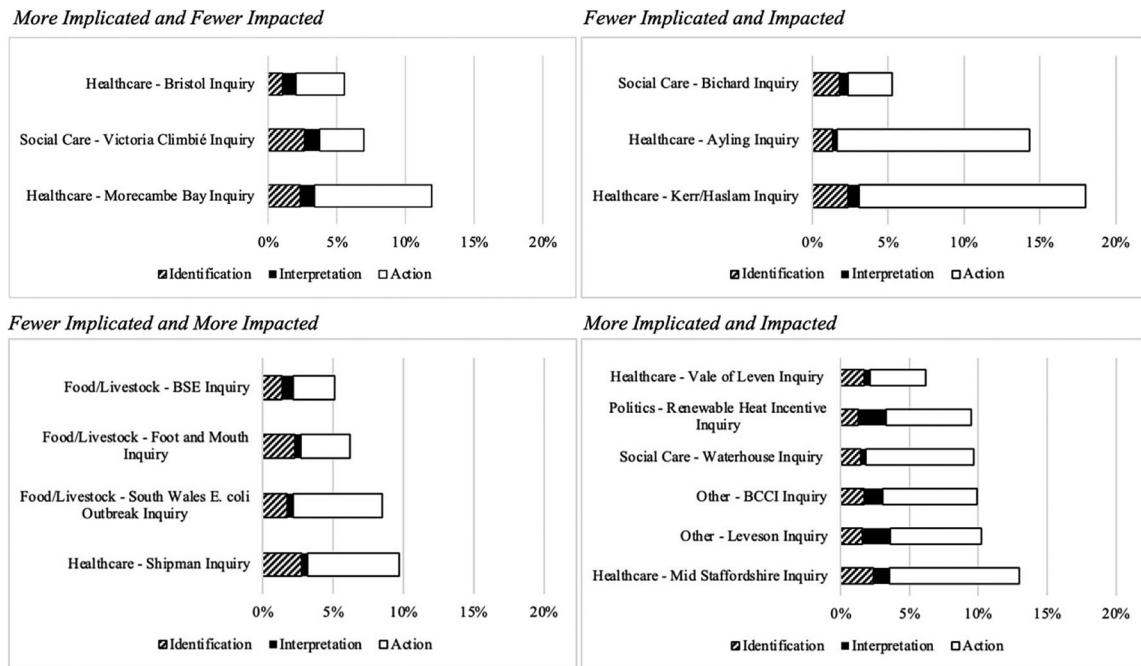


Figure 1. Percentage of sentences relating to corrective culture in inquiry reports that focus on understanding why problems were not addressed (grouped by failure type)

shape outcomes, and to surface less typical interactions or contradictory evidence: the analysis is summarized in Table 3.

The analysis of text found prototypical ways in which the three elements interacted and undermined organizations dealing with problems. For example, failures in identification were found in multiple cases to preclude opportunities for interpretation and action. This included veterinarians not detecting a new disease ('Mad Cow Disease') (Phillips, 2000) and civil servants not identifying misuses of a government scheme (Coghlin, O'Brien and MacLean, 2020). Failures of interpretation were also common but less widespread, and often caused inaction. For example, in the BSE outbreak, the government delayed a ban on using animal protein in feed so that farmers could use up their stocks due to an incorrect understanding of the extent of infection (Phillips, 2000). More generally, failed action was found to stem from sequenced problems in identification and interpretation (e.g. healthcare staff not halting unsafe operations due to not identifying and correctly interpreting surgery outcomes; Kennedy, 2001).

The analysis also revealed interactions between the elements that were unexpected. Specifically, problems in interpretation could undermine identification, such as in the Bichard Inquiry, where an early failure by police to interpret the significance of the perpetrator's prior criminal record meant they could not later identify a risk to children (Bichard, 2004). Alternatively, actions could lead to problems being suppressed or masked. For in-

stance, the Vale of Leven Hospital Inquiry found that the hospital circulating a leaflet on bacteria was correct but insufficient to address rising cases of a dangerous bacterium (MacLean, 2014).

Whilst the analysis for RQ2 supported the idea of corrective culture elements interacting to shape outcomes, albeit in unexpected ways, the inquiry contexts challenged the model. Specifically, in some cases malfunctioning interactions between elements were truly systemic (e.g. Mid Staffordshire Inquiry), whilst in others they were far more localized (e.g. Shipman Inquiry) or had people trying to fix them (e.g. Bristol Inquiry). This resonates with Martin's (1992) description of subcultures and ambiguities, with corrective culture problems not necessarily being universal, but operating at macro- and micro-levels and becoming salient and impactful when either widespread (e.g. creating a general *modus operandi*) or embedded into narrow but critical parts of a system (e.g. audit, regulators).

RQ3. How breakdowns in the corrective culture loop dynamically contribute to institutional failure

Based on the analysis of RQ2, we selected a typical and atypical inquiry for in-depth study. We examined, in these different cases, how breakdowns in the corrective loops could lead to institutional failure.

Our example chosen as a 'typical' case was the Bristol Royal Infirmary (BRI) inquiry, selected due to the typicality of element interactions, relatively bounded

Table 3. Typical and less typical patterns of failure observed

Failures of identification blocking interpretation		Illustrative excerpts
<i>Typical failures of identification</i>	<p>Failure to identify that a GP was responsible for over 200 patient deaths, because of failures in monitoring GP death rates and drug prescriptions, led to delays in interpretation and action. (Shipman Inquiry; Smith, 2002)</p> <p>Failure to identify risks associated with government schemes to incentivize businesses' use of renewable heat. (Renewable Heat Incentive Inquiry; Coghlin, O'Brien and MacLean, 2020)</p> <p>Failure to identify fraud at BCCI despite serious allegations. (BCCI Inquiry; Bingham, 1992)</p>	<p>'An almost total lack of effective supervision meant that poor practice went unnoticed and unchallenged. A lack of sufficient numbers of staff with the skills and training necessary to perform the tasks required of them, meant that the systems in place were on the verge of collapse'. (Victoria Climbié Inquiry; Laming, 2003, p. 107)</p>
<i>Sometimes a failure of interpretation hinders identification</i>	<p>Police failed to identify a caretaker as a potential suspect because they did not interpret the caretaker's prior criminal activity to be relevant. (Richard Inquiry; Richard, 2004)</p> <p>A member of the public's concern that businesses were misusing the Renewable Heat Incentive Scheme in order to receive payments (e.g. by constantly heating) was dismissed by departmental officials (identification) because of the erroneous belief (interpretation) that people would not engage in such practices. (Renewable Heat Incentive Inquiry; Coghlin, O'Brien and MacLean, 2020)</p>	<p>'This approach from the Trust seems indicative of a general failure to appreciate the weakness of its clinical governance, which failed to provide a systematic approach to identifying and addressing risks'. (Morecambe Bay Investigation; Kirkup, 2015, p. 142)</p>
Failures of interpretation blocking action		Illustrative excerpts
<i>Typical failures of interpretation</i>	<p>A high rate of infant deaths during surgery did not lead to sufficient action because of interpretations that the infants had exceptional complications. (Bristol Inquiry; Kennedy, 2001)</p> <p>The government incorrectly interpreted that BSE posed no risk to humans and thus, instead of addressing it, the government issued reassurances to the public. (BSE Inquiry; Phillips, 2000)</p> <p>The significance of incidents in the maternity unit was not interpreted as indicating a problem. (Morecambe Bay Investigation; Kirkup, 2015)</p>	<p>'But her limited understanding of the seriousness of CDI led her not to challenge Sister Gargaro, and gave her no reason to involve Mrs Culshaw. Her attitude reflected a general approach to infection prevention and control that placed exclusive reliance on the Infection Control Nurses'. (Vale of Leven Hospital Inquiry; MacLean, 2014, p. 128)</p>
<i>Sometimes the interpretation is correct but additional interpretations undermine action</i>	<p>A nurse correctly interpreted sexual abuse of patients with mental illness by psychiatrists and also interpreted that raising the issue would increase patient distress. (Kerr/Haslam Inquiry; Pleming, 2005)</p> <p>An Environmental Health Officer considered the use of the same machine for packing cooked and raw meats as safe so long as it was properly disinfected, but also incorrectly assumed the business would do this. (South Wales <i>E. coli</i> Outbreak Inquiry; Pennington, 2009)</p>	<p>'In 1968 a young woman, Patient A3, a patient at Clifton Hospital, alleged to [a nurse] that she had been raped by William Kerr. [The nurse] told no one. She should have done. Her decision not to speak out was based entirely on her view that to take the matter further would bring nothing but trouble and further harm to the patient who was ill and in great distress. However, her decision not to speak out meant inevitably that there was no record of the allegation'. (Kerr/Haslam Inquiry; Pleming, 2005, p. 99)</p>
Failures of action blocking identification		Illustrative excerpts
<i>Typical failures of action</i>	<p>Junior doctors unable to voice concerns (action) to cliques senior consultants. (Bristol Inquiry; Kennedy, 2001)</p> <p>Failure to act on rumours and complaints of abuse of children in care. (Waterhouse Inquiry; Waterhouse, 2000)</p> <p>Total closure of public footpaths to hinder spread of Foot and Mouth Disease in livestock negatively impacted rural economies. (Foot and Mouth Inquiry; Anderson, 2002)</p>	<p>'It is clear that there were a number of opportunities for ward nurses and ICNs to discuss patients with diarrhoea and CDI, but this did not result in the problem being identified at an earlier point in time. Nor did these opportunities appear to have had an impact on the ward nurses' knowledge of the condition or of how to manage patients with CDI properly'. (Vale of Leven Hospital Inquiry; MacLean, 2014, p. 185)</p>

Table 3. (Continued)

Failures of action blocking identification	Illustrative excerpts	
<i>Sometimes small corrective actions merely suppress the symptoms of deeper failings</i>	Circulating a leaflet on bacteria did not solve the problem of an outbreak of <i>Clostridium difficile</i> on a ward, yet supported a belief in being proactive. (Vale of Leven Hospital Inquiry; MacLean, 2014)	‘There was a failure to examine whether similarities with an earlier case warranted further investigation. “An assumption was made that the length of time that had passed was sufficient to conclude that there was no pattern and that training would be enough” [a report by the Health Service Ombudsman]’. (Morecambe Bay Investigation; Kirkup, 2015, pp. 129–130, original emphasis)
<i>Sometimes the failure to take action based on a previous corrective loop inhibited subsequent identification</i>	The failure of routine complaint investigations to properly document concerns undermined the subsequent identification of a larger pattern. (Morecambe Bay Investigation; Kirkup, 2015) Failure of the regulator to investigate an allegation of fraud by a bank because it did not allegedly occur in the United Kingdom, meant that the practices of the bank leadership went unidentified. (BCCI Inquiry; Bingham, 1992)	‘The complaint was passed on to the Nursing Sister [...] who informed William Kerr of the allegation. It appears that the complaint was dismissed as false without any investigation’. (Kerr/Haslam Inquiry; Fleming, 2005, p. 94)

problems, clear outcomes, similarity to other healthcare failures and previous use as an example of cultural failure (Weick and Sutcliffe, 2003). The inquiry investigated the causes of unsafe surgery at BRI, where mortality rates for children receiving heart surgery were ‘roughly double’ national rates between 1988 and 1994 (Kennedy, 2001, p. 4). The inquiry surmised that BRI failed to ‘respond quickly and effectively’ to unsafe care due to its ‘systems and culture’ (Kennedy, 2001, p. 5), and we found this observation to be instantiated in five non-linear, often recurring and failed corrective loops for addressing problems.

Loop one: from 1984, problems in BRI were recognized contemporaneously by several external bodies (e.g. the South Glamorgan Health Authority, Chief Medical Officer Wales). Each of these initiated subsequent corrective loops that failed. For instance, the Chief Medical Officer Wales raised concerns to the Chief Medical Officer England, who directed him to an overseeing body, which dismissed the information due to insufficient data.

Loop two: information on unsafe treatments was available within BRI, including an internal publication of 70 post-mortem examinations of children who had heart surgery, which indicated a prevalence of surgical errors. Data indicating unsafe surgery was misinterpreted as being due to ‘a small number of complex procedures’ within the hospital, and therefore reframed (Kennedy, 2001, p. 136).

Loop three: explicit concerns were raised by a consultant anaesthetist to senior clinicians who would not accept the concern without further evidence. Similarly, the Chief Executive did not view the concerns as relating to quality of care, and so took no action. Thus, whilst the corrective loops enacted by the consultant were ‘successful’ in the sense that he identified, interpreted and acted

on a problem, corrective loops operating at an institutional level failed.

Loop four: because there were existing plans to improve safety by limiting children’s surgeries to one site (Kennedy, 2001), concerns about safety from different sources (e.g. patients) were ‘interpreted merely as complaints that matters were less than ideal, rather than that they were unacceptably poor’ (Kennedy, 2001, p. 164).

Loop five: new clinicians identified a problematic mindset around safety when entering the hospital, but had difficulty raising concerns because of the ‘sense of a club’ amongst seniors (Kennedy, 2001, p. 165). This issue was ongoing, with many clinicians leaving the hospital out of frustration, meaning their attempts at correction failed.

By illustrating how multiple and independent corrective loops failed in the BRI case, we found evidence supporting the idea that malfunctions in corrective culture led to systemic and widespread breakdowns in processes for identifying, interpreting and acting on problems. This inhibited the single-loop learning needed to solve problems (e.g. stopping unsafe surgery), and also the double-loop learning that is required to address the causes of unsafe surgery (e.g. taking whistleblowers seriously, breaking the ‘club culture’; Kennedy, 2001, p. 68). However, as in any complex case, other factors beyond corrective culture were also key: resource constraints, absence of skills, de-prioritization of safety, absence of a national monitoring system and unclear regulation.

Next, we focused on the BCCI inquiry, selected due to the atypicality of element interactions, unbounded problems (regulators and regulated organizations), different outcomes (organizational collapse) and context (banking). The inquiry investigated failures in supervision, mainly by the Bank of England (BoE), of the Bank

of Credit and Commerce International (BCCI), which was closed in 1991 due to fraud and malpractice. Problems emerged over many years (from 1974) and the inquiry considered regulatory lapses in addressing BCCI 'over-trading and trading at a loss' and neglecting 'prudential matters as ratios and bad debt provisions' in pursuing growth (Bingham, 1992, p. 32). Four non-linear and failed corrective loops were identified.

Loop one: customers and banking professionals raised concerns about practices at BCCI since 1974, however, the BoE interpreted concerns as 'disgruntled' or owing to 'commercial disputes', reflecting 'cultural differences between BCCI and more familiar Western banks, or racial prejudice, or the resentment of banks discomfited by the operations of a young, aggressive and apparently successful newcomer' (Bingham, 1992, p. 31). The fact that alternative evidence contradicted this (e.g. assessments by other banking supervisors) meant allegations were interpreted as reflecting 'uneasiness' rather than 'imminent catastrophe', and negated action (Bingham, 1992, p. 32).

Loop two: concerns were raised by the Deputy of Banking Supervision at the BoE, who wrote a critical review of BCCI calling for greater supervision, but this 'provoked no action' (Bingham, 1992, p. 39). As before, signals indicating the bank to be stable, rather than the opposite, were more influential, and it was not recognized that signals of concern were being explained away.

Loop three: the critical review was revisited as further events solidified the concerns, and a strategy for investigating BCCI and improving practice was proposed and agreed. However, resistance from BCCI meant the action failed, and there were no legal means to enforce it. According to Bingham (1992), 'the introduction of formal legal powers led officials to lose sight of the Bank's informal authority' (p. 41).

Loop four: as time passed, more concerns were raised to the BoE, including a serious complaint from a shareholder, but these did not lead to action. Ultimately, malpractice at the bank was confirmed by a US Customs investigation. Echoing the corrective loop in the inquiry's recommendations, Bingham (1992) stated: there is a need 'to ensure (...) that appreciation of a problem is reinforced by willingness, where appropriate, to take decisive action' (p. 181).

As with BRI, the BCCI inquiry gave insight on how, through widespread, recurring and distributed breakdowns in corrective loops, malfunctions in corrective culture undermined the single-loop learning needed to prevent misconduct at BCCI, and the double-loop learning required for the BoE to recognize that its focus on protecting the bank and lack of action on fraud was aggravating the failure (i.e. enabling BCCI to continue). Yet, the case also differed from BRI as: (i) the failure occurred due to cultural problems in two organizations, which fed off one another (e.g. BCCI being encouraged

by lack of action at the BoE); (ii) analytical errors rather than cultural problems underlay failures; and (iii) corrective culture was misdirected (e.g. the BoE protecting BCCI from competition). Moreover, both analyses revealed a paradox that challenged the corrective culture model. Specifically, where a problem has become embedded in an organization (e.g. unsafe surgery, fraud), it is difficult to resolve without 'double-loop learning' whereby it is recognized that secondary problems in the culture are aggravating and preventing issues from being resolved. Yet, because the cultural factors (e.g. denial) stymieing the resolution of the originating issue *also* prevent organizations from addressing the secondary cultural problems, they may not be able to fix the breakdowns in their corrective loops.

RQ4. Evaluating the model

Finally, our examination of the 54 inquiries found Chairs to describe corrective culture as a contributory factor in 75.93% of the institutional failures (see Table 4 for a sample of quotes, and Supporting Information File 2 for all).

In 38.89% of cases, Chairs described the whole model including the interdependencies between elements and how they undermined the corrective loop. For instance, at Mid Staffordshire Hospital Trust, failure arose from 'a culture of fear in which staff did not feel able to report concerns; a culture of secrecy in which the trust board shut itself off from what was happening in its hospital and ignored its patients; and a culture of bullying, which prevented people from doing their jobs properly' (Francis, 2013, p. 10 [Executive Summary]). Chairs described problems in corrective culture leading to failures at the level of operations (e.g. Ladbroke Grove rail disaster; Cullen, 2001), managerial control (e.g. Stephen Lawrence Inquiry; Macpherson, 1999) and executives (e.g. Foot and Mouth Crisis; Anderson, 2002), with these combining and interacting over time. Indeed, abductively, Chairs recognized that the inquiries themselves were part of a corrective loop: for example, arising from past problems in learning from failures (e.g. Hillsborough Stadium Disaster; Taylor, 1989). Further analysis found, in domains such as the NHS, that inquiries not only reflected on unlearnt lessons from past inquiries (e.g. Mid Staffordshire Inquiry; Francis, 2013), but also anticipated failures: 'Unless lessons are learned, it certainly could happen again' (Bristol Inquiry; Kennedy, 2001, p. i).

In a further third of cases, Chairs reported on two (16.67%) or three (11.11%) elements of the corrective culture model. These tended not to describe a holistic view on corrective culture, but considered elements individually. For example, in the Royal Liverpool Children's Inquiry (Redfern, 2001) into 'the removal, retention and disposal of human tissue' (p. 5) without

Table 4. Examples of Chairs describing problems in corrective culture

Malfunctions in the corrective loop	
Failures in addressing child abuse (Victoria Climbié Inquiry)	‘(...) Neil Garnham QC listed no fewer than 12 key occasions when the relevant services had the opportunity to successfully intervene in the life of Victoria. As evidence to the Inquiry unfolded, several other opportunities emerged. Not one of these required great skill or would have made heavy demands on time to take some form of action. Sometimes it needed nothing more than a manager doing their job by asking pertinent questions or taking the trouble to look in a case file’. (Laming, 2003, p. 3)
Failures in addressing financial mismanagement (Renewable Heat Incentive Inquiry)	‘Officials were not encouraged sufficiently or effectively to have a questioning attitude, to escalate concerns, to pause for investigation or to suggest that developments be stopped when problems arose. Instead, a culture of “delivery” [predominated] to the extent that issues that should have been escalated were not’. (Coghlin, O’Brien and MacLean, 2020, p. 198 [Vol. 3])
Malfunctions in the three elements of corrective culture	
Failures in addressing unsafe working routines (Piper Alpha Inquiry)	‘[Occidental] were too easily satisfied that the permit to work system was being operated correctly, relying on the absence of any feedback of problems as indicating that all was well’. (Identification; Cullen, 1990, p. 3 [Vol. 1]) ‘In the face of a known problem with the deluge system [management] did not become personally involved in probing the extent of the problem (...)’. (Interpretation; Cullen, 1990, p. 3 [Vol. 1]) ‘[Occidental] failed to provide the training required to ensure that an effective permit-to-work system was operated in practice’. (Action; Cullen, 1990, p. 3 [Vol. 1])
Failures in addressing child abuse in community homes (Waterhouse Inquiry)	‘The few residents who complained were discouraged and their complaints generally suppressed (...)’. (Identification; Waterhouse, 2000, p. 798) ‘The investigations (...) of Alison Taylor’s complaints were defective in many respects and may fairly be described as “sluggish and shallow”’. (Interpretation; Waterhouse, 2000, p. 803) ‘The Social Services Department failed to respond positively to successive adverse reports on individual community homes (...)’. (Action; Waterhouse, 2000, p. 795)
Malfunctions in two elements of corrective culture	
Failures in addressing unsafe gas pipes (ICL Inquiry)	‘There was an identifiable failure to follow up on previous inspections’. (Identification; Gill, 2009, p. 90) ‘The repeated failures of inspectors to take notice of the buried LPG pipework on such visits or to insist upon a sufficient investigation represented missed opportunities for its continuing corrosion to be detected’. (Interpretation; Gill, 2009, p. 93)
Failures in addressing mistreatment of psychiatric patients (Fallon Inquiry)	‘(...) the “inquiry culture” left good, committed staff feeling that they could only be found at fault. He painted a picture of a place where complaints and incidents spawned investigations and inquiries as part of the daily routine. There was very little time to stand back and look at the bigger picture’. (Interpretation; Fallon, 1999, para. 2.33.13) ‘Indeed, at times we felt that the Hospital had become almost paralyzed by a huge paper chase, as committee after committee sat, pondered and deferred decisions (...)’. (Action; Fallon, 1999, para. 2.36.29)

consent, the chair describes but does not link problems in identification (‘there had been no routine reporting of post mortem histology’: p. 207), interpretation (‘during audits no-one appears to have examined the source documents’: p. 258) and action (‘should have led to the disciplining of Professor van Velzen’: p. 218). Corrective culture was inferred, but not explicitly recognized. Where only two elements were highlighted by the chair, this seemed to be because one element was not problematic, or not relevant.

In the final third of cases, chairs described one element (9.26%) or no elements (24.07%) of the corrective culture model. These cases primarily focused on the future (e.g. how to improve rail safety), ascertaining whether something had gone wrong (e.g. misman-

agement of prisoners) or other factors (e.g. competencies, technical issues) underlying incidents.

Finally, an implied theme across inquiries was that, rather than being directed at fixing any one problem, failures in corrective culture were ultimately about institutions lacking the double-loop learning needed to recognize when activity in the organization was running counter to its purpose and function. The inquiry into the tragic case of Victoria Climbié illustrated this: ‘The dreadful reality was that these services knew little or nothing more about Victoria at the end of the process than they did when she was first referred to Ealing Social Services (...). The final irony was that Haringey Social Services formally closed Victoria’s case on the very day she died’ (Laming, 2003, p. 3).

Discussion

Our analysis of public inquiries established the proposed elements of corrective culture, revealed its dynamic nature and demonstrated how malfunctions in corrective culture not only prevent problems from being addressed within organizations (which leads to them becoming embedded and amplified), but also undermine the double-loop learning processes needed to resolve secondary problems (e.g. denial) that prevent originating problems from being addressed. Moreover, it highlighted how, through analysing public inquiries in aggregation, theoretical and practical lessons can be learnt on the causes of institutional failure.

Our findings on corrective culture are limited to recent UK public inquiries, and the proposed model requires expansion and refinement because it did not fully explain all failures and was often only a part of the puzzle of understanding how culture shaped events. For example, the model was challenged by inquiries showing that corrective culture could be misdirected rather than poor, only exist within narrow parts of organizations, be fuzzy in terms of distinctions between elements, have unexpected features (e.g. culture problems crossed multiple organizations) and have other factors predicting failures (e.g. skills, regulatory issues). An intriguing finding was that public inquiries could themselves be part of a corrective loop, sometimes failed, with recommendations often not leading to the desired outcomes. This observation was particularly pertinent to large domains (e.g. healthcare, policing) that have systemic challenges (e.g. political, resourcing) and enduring shibboleths that inquiries can identify but not alter. Where public inquiries have been effective (e.g. the UK oil industry after Piper Alpha), industries have been compelled to undertake the policy, financial, technical and legal changes need to improve culture and prevent future failures. In this sense, whilst external interventions (e.g. from government, regulators and audit) can be critical for recognizing failures and explaining them, their role within the corrective loop depends on their authority to create change and the wider context (e.g. financial).

Implications

The investigation of corrective culture drew on theories of organizational accidents, resilience and HROs and double-loop learning and, through synthesizing these concepts together into a single model, advances these literatures.

For research on organizational accidents, our analysis explains the role of corrective culture in events. Typically, concepts such as safety culture have been conceptualized as 'latent' variables that undermine the design and decision-making within an organization,

and negatively influence behaviour at the operational level (e.g. not reporting incidents) (Reason, 2000). The corrective culture model frames culture as an 'active' factor in accidents: shaping the development of a hazard, influencing behaviour on how it is managed and itself becoming a secondary risk that must be resolved (Turner, 1976). This addresses the critique that accident models are static and lacking in dynamism (Larouzee and Le Coze, 2020) and corresponds with Hald, Gillespie and Reader's (2021) idea that incidents are exacerbated through problems in corrective culture. Building on this, future research should consider how corrective culture interacts with concepts such as safety culture.

Theories on resilience engineering and HROs have considered the role of culture as an influencing factor, but have not developed formal models of how it shapes threats and how hazards are effectively managed (Duchek, 2020; Hollnagel, 2009; Nævestad, 2009; Weick and Sutcliffe, 2007). Safety culture is considered important because it captures important mindsets (e.g. for prioritizing safety), yet can lack contextual consideration 'of the work itself that is being carried out in the organization in question' (Reiman and Oedewald, 2007, p. 749). This is in contrast to theories such as HRO theory, which focuses on activity and for which culture can be a risk factor that generates 'a simple set of expectations' that limit how people interpret problems, necessitating that people 'weaken the grip of this invisible hand of expectations so that they can see more, [and] make better sense of what they see' (Le Coze, 2019; Weick and Sutcliffe, 2007, p. 32). The corrective culture model contributes to this work by conceptualizing the situated activities of identifying, interpreting and acting in terms of cultural norms and behaviours that pervade organizations. Future research should focus on cultural features of resilience and HRO theory, and how they feed into the processes for managing and adapting to hazards and threats.

In terms of double-loop learning, our analysis found that malfunctions in corrective culture not only prevent the resolution of originating problems, but also compound these by creating secondary problems. The analysis shed light on how double-loop learning processes in organizations are simultaneously a product of organizational culture and a route by which cultural problems are fixed. Oftentimes, inquiries described how failed corrective loops moved people *further* from resolving the originating problems. For instance, in the Victoria Climbié Inquiry, failures to take action by social services meant not only that obvious abuse was missed, but that gaps in safeguarding processes were not addressed, which enabled continued abuse. This is similar to 'organizational iatrogenesis', where problems in the handling of an error reveal or create secondary and unexpected problems, leading to the original error becoming normalized, worse or impactful on task environments (see

Meckler and Boal, 2020), and a constraint on future behaviour (Lei and Naveh, 2023).

Double-loop learning theory enabled us to tease apart the nature of originating and secondary problems in the corrective culture model and we theorized that, once a corrective loop has failed, the malfunctions in identification, interpretation and action that led to this must be overcome to prevent the originating problem from reoccurring and growing. Yet, the analysis of public inquiries found this to be paradoxical: namely, the self-same cultural problems that lead to an originating problem going unresolved also prevent fixing malfunctions within the corrective culture (e.g. where there were tendencies to ignore or explain away deviations). From this standpoint, the corrective culture model becomes somewhat circular, and the focus moves on to how this paradox can be overcome, with Argyris and Schön (1996) providing valuable insights. In particular they, along with Turner and Pidgeon (1997), indicate that for organizations to adapt their *modus operandi* they require disruptive feedback that is below the level of a severe failure, yet above a level that can be concealed or denied, and therefore provides an impetus for transformative change. Such feedback ‘kickstarts’ the corrective loops necessary for fixing both the culture and originating problems, and needs to be designed into organizations through the creation of independent information channels. This includes procedures for receiving unvarnished feedback from service users, enabling members to talk freely without fear of repercussion, oversight from regulators who are distant and transparent, ensuring cognitive diversity in decision-making bodies and having external stakeholders evaluate whether an organization is remaining true to its purpose and mission.

A final contribution is our combined use of NLP and qualitative methods. We integrated two research methodologies that, although rarely combined, use the same data: text. As large-scale qualitative datasets become increasingly available, this mixing of NLP with in-depth qualitative analysis is increasingly recognized as valuable (Ho *et al.*, 2021). By using NLP to structure, codify text, identify concepts and surface relevant statements, and qualitative analysis to validate measures, challenge quantitative patterns and abductively generate theoretical insights, we were able to identify and challenge commonalities across the aggregated corpus of public inquiries. Further theorization of how NLP and qualitative analysis can augment one another is crucial for unlocking the potential of vast troves of (previously intractable) rich qualitative data. But, methodological diversity should be maintained. Future research should try to validate our findings using different methods, such as creating a corrective culture survey and investigating whether the three elements emerge as coherent dimensions.

Limitations

The analysis is limited by the nature of the public inquiry data and our mixed-methods approach. The key issues with the public inquiries are their retrospective and political nature, their focus on public institutions, internal biases, implicit focus on corrective culture and desire to impose a single narrative on events (Brown, 2000).

Regarding our methodology, although reliable and transparent, the NLP had limitations (e.g. errors in text classification) and, through the analysis, erred towards confirming rather than disconfirming theoretical assumptions (i.e. by not classifying without the concepts specified in the model). With the NLP focusing on textual patterns rather than meanings or narratives, and the qualitative analyses potentially being limited in abductive theorizing by focusing on sentences identified by the text classifier, our mixed-methods approach might have been overly confirmatory or circular. For the inductive and abductive analysis, we attempted to introduce analyses and data that challenged the model (e.g. the Chair statements), but given the centrality of the text surfaced by the NLP, the focus of the analysis remained close to corrective culture and less likely to surface other relevant concepts or aspects of the model.

Conclusion

When President John F. Kennedy said that ‘an error doesn’t become a mistake until you refuse to correct it’, he was focusing on how errors must be openly discussed within a society. Deepening this insight, our analysis of the public inquiries found that, despite their diversity, cultural problems in how organizations respond to problems often featured in catastrophic institutional failures. The mixed-methods analysis provided qualified support for the model of corrective culture. Our analysis showed how malfunctions in norms and behaviours for identification, interpretation and action led to breakdowns in corrective loops, with these compounding the initial problems (e.g. unsafe behaviour) and necessitating double-loop learning where organizations fix their *problems in dealing with problems*. We conclude that when organizations are in this deeply challenging situation, they require transparent and strong feedback that compels them to improve their corrective culture, thereby addressing not only the originating problems, but also problems in the corrective identification–interpretation–action loop.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section at the end of the article.