Close Calls: Reclaiming the Nuclear Hotline as a Communication Technology

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Public discourse commonly depicts "communication" as a crucial function of nuclear hotlines. However, scholars have not critically examined images of communication that dominate the development and use of nuclear hotlines. Analysis of related institutional narratives reveals their multiple, competing conceptions of "communication." While this interpretive flexibility may serve the needs of nuclear hotline stakeholders, it also creates ambiguity and contradiction that may distort its ongoing development. We subsequently surface key meanings of communication associated with the history, technology, and institutions of the nuclear hotline. We focus on two limitations of these narratives—*the perpetuation of instrumental illusions*, and the *insensitive conception of mediated communication*—and their implications for nuclear hotline development. We conclude by reviewing the benefits of revising these narratives and proposing an agenda for communication research.

Keywords: communication technology, nuclear hotline, nuclear deterrence, nuclear weapons

　　　　Throughout the western liberal democracies, current events have revived public awareness about the high-risk conduct of nuclear deterrence and crisis management. The immediate crisis, of course, involves the Russian invasion of Ukraine, in which Vladimir Putin has repeatedly displayed nuclear threats to inhibit both Ukraine's response and potential military support by NATO's member-nations. Simultaneously, China is closely observing the west's response to Putin's invasion and drawing lessons for its own ambition to reclaim Taiwan. This latter process unfolds amid China's ongoing modernization of its nuclear forces, intended to disrupt U.S. deterrence.

　　　　The purpose of this essay, however, is not to examine these nuclear developments. Instead, we use them as a starting point to reclaim a taken-for-granted artifact of nuclear crisis management *as a communication technology*. That artifact is *the nuclear hotline.* Culturally, the nuclear hotline is associated

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with images of actual and imagined Cold War-era conflicts, in which U.S. and Soviet officials are depicted making use of technological links to engage in urgent communication. Typically, their exchange serves to avert or minimize a nuclear conflict triggered by "an accident, miscalculation, or surprise attack" (Arms Control Association, 2020, para. 1). For these reasons, the nuclear hotline has been institutionalized as a component of nuclear crisis management—and disregarded as a relic of the first nuclear age.

The continued relevance of the nuclear hotline, however, has been demonstrated in the cases mentioned above. Amid the Russia-Ukraine conflict, for example, media sources have speculated about the effectiveness of existing military and political "back-channels" between U.S. and Russian officials (Bender, 2022). Concerning the China-Taiwan conflict, U.S. diplomats warn of the growing risk created by Chinese disdain toward using hotlines (i.e., to maintain strategic uncertainty among opponents; Borger, 2021).

These cases display a similar orientation to the nuclear hotline as a communication technology. That orientation combines three related sets of beliefs. The first is an *objectivist* view of the nuclear hotline as a concrete tool or system, one whose existence is grounded in a distinctive arrangement of material components (e.g., interfaces, circuits). Second, these cases display a *techno-determinism* that depicts the hotline's conventional design and operational status as primary influences on its usage (i.e., it either does or does not accomplish nuclear crisis management). Finally, these cases reflect an *instrumental-cybernetic* orientation that narrows understanding of the hotline's potential usage (i.e., as exclusively official), and of its related communication as *the exchange of information intended to reduce uncertainty*.

In this essay, alternately, we adopt a social-constructivist orientation toward the nuclear hotline—one that is generally concerned with the contingent role of cultural norms and beliefs in shaping users' practical negotiation of its technological affordances (Aradau, 2016). This orientation, we argue, allows us to both illuminate and problematize the nuclear hotline's *communicative* status. Specifically, we argue that the nuclear hotline is *a symbolic site of competition* between institutional narratives depicting *what "communication" is* and *how it should be practiced* within the realms of nuclear deterrence and crisis management. This competition matters, we maintain, because these narratives generally perpetuate the objectivist, determinist, and cybernetic frames described above. This condition is undesirable, partly because it prematurely closes wider understanding of the hotline's social, political, and ethical dimensions. For this essay, subsequently, we define "nuclear hotline" as *a technological system enabling speakers to conceptualize, perform, and contest discourses of nuclear deterrence and crisis communication*.

The issues we explore in this essay are particularly relevant for actual developers of the nuclear hotline—including participants in the current international, cross-sector project known as "CATALINK" (Shah & Walker, 2021). The professionals involved in CATALINK seek to redesign existing nuclear hotlines to exploit the operational benefits of digital computing and open-source technology, including portability, connectivity, and encryption (Nautilus Institute, Stanley Center for Peace and Security, and Technology for Global Security, 2020). Potentially, the CATALINK project will encourage both expanded and standardized international usage of nuclear hotlines (e.g., for multilateral exchanges). In this essay, we draw partly for

our analysis on publicly available reports stemming from a recent series of CATALINK-organized workshops and conferences.[1]

Below, we develop our argument in the following sections. First, we provide a historical overview of political and technical issues surrounding development of the nuclear hotline. Second, we characterize two institutional narratives of "communication" associated with the hotline's development. The first, derived from theories of nuclear deterrence, is concerned with distinguishing "communication" as a key function—along with "capability" and "credibility"—required for deterrent effectiveness. The second, derived from the planners of nuclear command and control systems, strives to resolve ambiguity arising from multiple connotations of "communication." In each case, speakers attempt to discipline "communication" as a primarily strategic and technical phenomenon. Despite these efforts, however, the significance of communication evades control and persists in nuclear hotline discourse as an awkward object of ambivalence. Third, we discuss two limitations created by these narratives for public and professional understanding of nuclear hotline communication, including the *unreflective perpetuation of instrumental frames* and *insensitive conceptualization of mediated communication*. We conclude by considering the potential benefits for nuclear hotline stakeholders of revising these narratives and proposing an agenda for future research.

Overview of the Nuclear Hotline: History, Technology, Usage, and Effectiveness

Historical Development

Conventional accounts establish the origin of the nuclear hotline in proposals during the 1950s for creation of a "Direct Communications Link" (DCL) between the Soviet and U.S. governments (Simon & Simon, 2017, pp. 285–286). The Berlin and Cuban Missile Crises galvanized the DCL's development. These events highlighted the superpowers' potential to initiate a nuclear conflict and the limitations of existing communication channels for exchanging related messages (Bell & Macdonald, 2019, p. 57; Egilsson, 2003, p. 2).

Moscow and Washington signed a related agreement in June 1963. Informally, both sides conceded the disconcerting ease with which they might erroneously attribute hostile intent to each other's actions, triggering both disproportionate response and irrevocable escalation (Miller, 2021, p. 2). Both recognized that a reliable hotline would enable national leaders to conduct critical communication in emergencies. Over time, the list of these functions expanded to include registering alarm, requesting and providing explanation, affirming intentions and commitments, maintaining control over the escalation of nuclear conflict, and negotiating its termination (Ball, 1991). Nonetheless, the actual signed agreement (U.S. Department of State, 2020) did not *require* either party to use the hotline or prescribe a rigid protocol for its use. These *lacunae* likely reflected compromise arising from concern that possession and use of a hotline might weaken the effectiveness of these states' deterrence posture.

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[1] Sources used in this essay include memoirs, policy documents, histories, academic studies, NGO reports, and informational overviews provided by government agencies. All sources are available in the open literature. We address the related impact of secrecy on nuclear hotline research in the conclusion

Technological Evolution

Over time, the form of the U.S.–Soviet DCL has significantly evolved (Ball, 1991). Between 1963 and 1978, the system's first generation used transatlantic telephone cables and duplex telegraph circuits to exchange encrypted transmissions between teletype terminals housed in Washington (at the Pentagon's National Military Command Center [NMMC] and Moscow; at the Kremlin, and the Red Square headquarters of the Communist Party). This network was supplemented by a backup radio line that was also used for the routine exchange of maintenance messages.

Partly because this initial infrastructure proved vulnerable to accidental interruption, its radio circuit was replaced in 1971 by a satellite system, consisting of two independent circuits and multiple ground stations linked to terminals by cable and microwave (the teletype circuit was preserved as a backup). During this period, a revised hotline agreement was signed by the United States and Russia, as well as an "Accidents Agreement" that specified circumstances authorizing the hotline's use—including notifications concerning accidental, rogue, or unexplained incidents involving nuclear weapons, as well as potentially provocative military actions such as missile test launches. This system became operational in 1978. In 1984, the U.S. and Soviet governments agreed to add facsimile technology to the DCL, which replaced its teletype circuit, and became operational in 1986.

The DCL's most recent upgrade occurred in 2007, including the installation of a dedicated computer network connected to satellite links by fiber-optic cable (Miller, 2021). This current system uses commercial software programs for communication purposes, including chat to coordinate operations and e-mail for the exchange of formal messages.

Connection to Nuclear Command and Control Systems

In the United States, the DCL is associated with an official system of "nuclear command and control" (NC2), which is administered by the National (Military) Command and Control System (NMCCS). The NC2 system is devoted to *ensuring* the availability of nuclear weapons for authorized use (i.e., positive control) and *preventing* their unauthorized, accidental, or mistaken use (i.e., negative control). It principally functions to convey operational messages between nuclear commanders and their forces. In turn, the NC2 system is nested within an even larger, globally dispersed system, known as "nuclear command, control, communications, and intelligence" (a.k.a. NC3I or NC3). This enormous meta-system is comprised of an estimated 100–200 separate communications systems serving U.S. defense, intelligence, military, and political entities, which collaboratively oversee its development and operation (Hayes, 2021). Technically, NC3 consists of

> the links between nuclear forces and presidential authority. It includes early warning satellites, radars, and sensors; facilities to collect and interpret early warning information; fixed and mobile [e.g., airborne] networked command posts; and a communications infrastructure that includes land lines, satellite links, radars, radios, and receiving terminals in ground stations and aboard strike vehicles. (Larsen, 2019, p. 2; see also Harvey, 2019).

Collectively, the human and nonhuman assets of the NC3 system coordinate to monitor events, collect and analyze intelligence, report unexpected developments, assess threats, and provide urgent alerts concerning apparent nuclear attack. This intelligence arises from both open and sensitive sources and assumes varying forms, including "statements of doctrine, political threat rhetoric, back-channel messages, diplomatic demarche, [and] changes in alert levels, force deployments, forward deployment, [and] nuclear warhead and delivery platform testing" (Hayes, 2021, p. 7). The NC3 system subsequently enables U.S. officials to discuss information, deliberate options, and communicate responses to military forces, allies, and adversaries. Potentially, those responses include preformatted "Emergency Action Messages" directing commanders of the U.S. nuclear-strategic triad (i.e., bomber, ICBM, and ballistic submarine forces) to execute preplanned attack options. In the event of actual nuclear conflict, this system would continue to function as long as possible, providing updates on the status of opposing forces, adapting to degradation of its capabilities, and executing (presumably) authenticated, lawful commands to deploy, use, and/or cease using nuclear forces. Historically, the designers and operators of NC3 systems have prioritized particular capabilities for communication. These include accessibility, accuracy (e.g., achieved through schemes of redundant verification), speed, security, reliability, and resilience. As with the DCL, the infrastructure of the U.S. NC3 system has evolved considerably over the past 70 years. It is currently undergoing extensive technological upgrades and bureaucratic reform seeking to augment those capabilities and streamline operations.

One key node where the DCL and NC3 system intersect is the Pentagon-based NMMC, which coordinates communication networks involving senior U.S. officials, U.S. nuclear forces, and the Russian DCL terminal. Another relevant (although defense-adjacent) node is the U.S.–Soviet Nuclear Risk Reduction Center (NRRC), whose terminals are housed in the Department of State and the Russian Ministry of Defense. The NNRC was established in 1987 as a supplement to the DCL and contributes to nuclear crisis management by enabling experts and officials below the level of heads of state to routinely exchange information and notifications—particularly those required from signatories to nuclear arms control agreements (Hannah, 2019, p. 4). Ideally, these activities contribute to transparency and trust building between nuclear powers and facilitate their negotiation and implementation of arms-control treaties.

Historically, NC3 systems have been key players in dramas of strategy, intuition, and blind luck through which nuclear states have (so far) narrowly escaped disaster. Nonetheless, commentators have consistently lamented the vulnerability and unreliability of these systems. Schlosser (2013), for example, has documented the disturbing failures of U.S. nuclear safety programs (e.g., accidental release of warheads during transport). Elsewhere, Blair (2020) has concluded that perennial and emerging threats posed to NC3 systems (e.g., by nuclear proliferation, technological innovation, and the potential unfitness of national leaders) create an "Achilles heel" that compromises a defender's ability to execute second-strike options, control conflict escalation, and negotiate war-termination (p. 16; see also Acton, 2019). "Taken together," Levgold and Chyba (2020) conclude, "this whole array of challenges raises the question of whether there can be crisis stability in a cluttered, heterogeneous nuclear environment and, if so, on what basis" (p. 8).

Other Agreements

Over time, the U.S.–Russian DCL became normalized in the international community as an admittedly limited, yet beneficial instrument of nuclear crisis management. Other nuclear powers followed

suit by forming related agreements—both with each other and with *non*nuclear states affected by their deterrence policies. The appendix to this essay displays a chronology of 13 agreements developed between 1966 and 2018 and involving 12 nations and 1 IGO (NATO).

Types and Functions

One implication of this history is that "the nuclear hotline" is less a singular, stable, predetermined object than an evolving categorization used by nuclear professionals—one that is "clearly flexible and adaptable" (Miller, 2021, p. 8). This flexibility is exacerbated by the "fabulously textual" (Derrida, 1984) condition of nuclear war, in which ontological distinctions between imagined, simulated, and actual nuclear phenomena are profoundly (if not paradoxically) blurred. The relevance of this condition for nuclear hotlines is illustrated by Ball's (1991) observation that two of the DCL's three official functions (i.e., escalation control and war termination) have never been live-tested—and would almost certainly fail if they were. Bearing this contingency in mind, we briefly survey the various types and functions of existing nuclear hotline systems.

Concerning types, while most nuclear hotlines are devoted to the conduct of bilateral relations between states, at least one connects a state (Russia) to an IGO (NATO), while some others—such as the U.S.–India system—signify *trilateral* relationships. Some hotlines are primarily intergovernmental (i.e., political), while others are intermilitary. Some are devoted to connecting heads of state, while others are intended for use by lower-level officials. Some international relationships have yielded a single system, while others (e.g., most notably, North Korea–South Korea) have developed multiple, distributed, and layered systems.

This diversity matters, because it raises the question of how multiple, coexisting media systems are (or should be) configured to serve international nuclear crisis management (see Siegel, 2011). Suri (2018), for example, notes that the tradition of national leaders using fixed, formal hotlines is being supplanted by their use of portable and informal systems (e.g., personal cell phones): "For [these] leaders . . . *the notion of a hotline has become more diffuse — there are many 'hotlines'*" (n. p.; emphasis added).

Concerning functions, while most nuclear hotlines appear exclusively dedicated to direct management of bilateral crises, some (e.g., the NRRC) are intended to serve—or are interpreted as serving—different purposes (Hannah, 2019, p. 4). The U.S.–India hotline, for example, illustrates *indirect* functionality—in this case, that of a superpower assisting (unevenly) two other nuclear states (India and Pakistan) in containing their volatility. In some cases, these differences may be deemed sufficient to call into question the identity of a particular system *as* (i.e., only) a nuclear hotline. Egilsson (2003), for example, distinguishes between DCL's and nuclear hotlines, arguing that DCL's are "not confined to acute situations and therefore do . . . not confer the same sense of urgency as the hotline" (p. 1). Miller (2021), similarly, distinguishes between hotline systems intended to *prevent* nuclear crises (e.g., through intermilitary notifications) versus *manage* them (e.g., through intergovernmental diplomacy). In a final example, Hannah (2019) proposes a "hotline-plus" system for use by India and Pakistan, that would initially provide "direct 24/7 secure communications between each country's top nuclear command elements" (p. 6). If both nations can tolerate using this system for that purpose, it might subsequently be used to "exchange information, including ballistic missile test launches and

annual data exchanges, as well as . . . support future negotiations and additional confidence-building measures" (Hannah, 2019, p. 3).

Usage

Our discussion so far has indicated that stakeholders of the nuclear hotline use interpretive categories to classify a range of candidate artifacts. These attributions, however, do not resolve to affirm a single, exclusive model of the nuclear hotline. Instead, they serve to maintain a partly consensual, partly contested *range* of models, which enables speakers to share orientations toward proposals for designing and using related systems. It should not be surprising, then, that these qualities of ambiguity, contingency, and flexibility saturate commentators' efforts to assess the appropriateness and effectiveness of actual hotline usage.

Our reading of this historical record suggests an evolving effort by the designers and users of nuclear hotlines to indirectly negotiate norms for that communication. The first "official" use of the U.S.–Soviet DCL occurred following John F. Kennedy's assassination in November 1963. Its first use to address a developing military conflict, however, occurred during the June 1967 Arab-Israeli war. Soviet Premier Kosygin initiated this exchange by urging President Johnson to collaborate in ending that conflict. Johnson subsequently used the hotline twice in three days to reassure Kosygin that U.S. military deployments in the region were not hostile to Soviet interests and that Israeli counterattacks were not sufficiently threatening to warrant Soviet intervention (Ball, 1991, p. 136; Egilsson, 2003, p. 24; Miller, 2021, pp. 3–4). Kosygin responded, however, that the gap between Johnson's statements and Israeli behavior indicated U.S. intentions to confuse and deceive the Soviets. When Kosygin used the DCL to issue a veiled threat, Johnson responded by deploying additional U.S. naval forces to the region. Kosygin did not escalate the conflict further, and it abated as Israeli forces stood down after achieving their desired gains.

This event appears to have solidified developing expectations concerning the functionality of nuclear hotlines. They would be used by superpower leaders for managing crises—particularly conflicts between allies that might drag their nations into nuclear war (Miller, 2021, p. 3). As Egilsson (2003) notes, "the hotline lived up to expectations and proved to be an effective tool to clear up misunderstandings, clarify intentions and avoid miscalculation which otherwise could have led to escalation of a conflict" (p. 24). Simon and Simon (2017), however, provide a more nuanced reading of this event, arguing that Soviet usage of the DCL exceeded the narrow scope of communicative functions formally agreed to by the superpowers, partly because Washington and Moscow officials differed in their attribution of unique significance to its use.

In part, these emerging norms of nuclear hotline usage were reinforced during the remainder of the Cold War and beyond. Soviet and American officials repeatedly used the DCL to request clarification, provide reassurance concerning mysterious and provocative developments, and express their related concerns—including by issuing each other cautions. In these cases, the superpowers were able to do so without resorting to direct military conflict—although not without also posturing, evading accountability, making carefully modulated threats, and offering underinformed and misleading claims. As a result, the historical record *also* reveals nuclear hotline users displaying either an apparent lack of shared norms, and/or a determination to subvert and innovate them. For example, Miller (2021) wryly notes that use of

the DCL by U.S. officials to "keep up the pressure" on the Soviets during the height of the 1971 Indo-Pakistani War "was not what the creators of the hotline had in mind" (p. 3).

The contested status of these norms is best illustrated, however, by hotline users' deliberate efforts to defy them—and in so doing, risking the "face" of their counterparts. Exemplary cases here include states failing to either maintain or monitor agreed-upon operational links or *ignoring* each other's efforts to initiate hotline exchanges (Egilsson, 2003, pp. 21–22; Shaheen, 2021; Shim, 2017). These cases confirm that the communicative functionality of the nuclear hotline is not dependent on its facilitation of direct interaction.

Assessments of Effectiveness

As a key instrument of nuclear crisis management, the hotline is subject to endless and spirited evaluation by its stakeholders. Here we do not seek to resolve this debate but rather to depict how related claims display stakeholder assumptions concerning *what* nuclear crisis communication *is* (or should be), and *how* it is (or should be) effective.

For example, Egilsson (2003) concludes that nuclear hotline stakeholders have, over time, adapted its *potential* effectiveness to serve four main functions (p. 26). These include serving both as a *crisis management apparatus* useful for preserving peace between nuclear states and as a *political symbol* with three layers of significance for global audiences. These layers include "allay[ing] public concern about the risk of accidental war" (Egilsson, 2003, p. 26), signaling the status of particular bilateral relationships (e.g., renewed and strengthened ties between states), and reinforcing the presumption of nation-states as rightful possessors and users of nuclear weapons.

Additionally, evaluations of nuclear hotline effectiveness rely upon competing assumptions concerning *which types of events* (and which of their specific occurrences) *qualify as exigencies legitimating (if not requiring) hotline usage*. For example, Ball (1991) cites controversy surrounding whether U.S. officials should have used the DCL to report the 1980 Damascus ICBM explosion at an Arkansas U.S. Air Force base (p. 137). Similarly, during a particularly dangerous September 1983 nuclear false alarm, the Soviet military response did *not* include using the DCL to check whether the United States had actually launched apparently inbound missiles (Schlosser, 2013, p. 447).

Because of these conditions, it is unclear exactly which (and whose) premises should serve (how) as the basis for assessing historical hotline effectiveness. To be sure, many speakers conclude that hotlines play a valuable—even if partial—role in nuclear crisis management. Suri (2018), for example, argues that hotlines have demonstrated at least three benefits, including preventing nonnuclear security threats from triggering a nuclear conflict, permitting officials to engage in "confidential dialogue, free from the public posturing that makes crisis de-escalation difficult" (para. 11), and finally, cultivating trusting relations among their users.

Other commentators are more ambivalent in assessing nuclear hotline effectiveness. Simon and Simon (2017), for example, conclude that the Soviets' use of the DCL during the 1967 Six-Day War partly confirms *both* traditional *and* revisionist narratives of DCL effectiveness. Specifically, while some of those

Soviet messages did indeed serve (however temporarily) to alleviate superpower tensions, Soviet officials also avoided clear opportunities to use the DCL for this preferred purpose, and instead used it for a range of other purposes. These included ways to "transmit important information to their American counterparts, to obscure Soviet intentions, to gain time, to express negotiating positions, to assign responsibility, and to threaten military intervention" (Simon & Simon, 2017, p. 298). Some of those individual messages, further, performed multiple functions. Simon and Simon thus recommend against simplistic and premature conclusions concerning hotline effectiveness. This is partly because the conventional media format of DCL communication (i.e., written teletype and e-mail) is a double-edged sword. Depending on situational needs, they conclude, this format may prove either too slow (i.e., compared to more agile audio-video exchange), or too fast (i.e., by precluding appropriate consultation of allies).

A final category of assessment is dubious. Partly because states are not required to report their usage of hotlines, for example, nuclear history contains an unknown number of crises that were averted arguably not *because* of hotlines, but *despite* the limitations of their systems and users. Here, Shaheen (2021) faults the insufficiency of technocentric paradigms for designing and using nuclear hotlines:

> [T]o avoid . . . [unnecessary] future risk, and to have better escalation control in practice, there is a serious need for nuclear-armed states to establish a communication link that will . . . also *socially bind those states within a normative structure* . . . to make them responsive toward nuclear risk reduction. (p. 155; emphasis added)

Problematizing and Revising Nuclear Hotlines as "Communication"

Our review above establishes the nuclear hotline as an exemplary display of "interpretive flexibility," in which the indeterminate affordances of a technological artifact alternately accommodate, confound, and stimulate the interests of its stakeholders. We seek, subsequently, to analyze how "communication" serves as a symbolic resource for these stakeholders in developing this artifact. Specifically, we argue that this process is shaped by largely unacknowledged conditions of ambiguity and contradiction, arising from the circulation of multiple and partly incompatible conceptions of communication. We develop this argument below, in three sections. First, we consider how, historically, communication has been depicted in the narratives of two institutional groups: theorists of nuclear deterrence, and the planners of NC3 systems. These narratives display varying mixtures of uncertainty and ambivalence concerning the status of "communication." Second, we discuss potential limitations arising from these narratives. We then propose some benefits of revising their conceptions of communication.

Traditional Conceptions of Communication

Circulating within and around nuclear hotline discourse are two primary narratives of communication. These narratives are performed by speakers across different situations, and their performances vary in levels of detail, formality, and explicitness. They generally function, however, to describe what hotline communication is, how it works within systems of nuclear deterrence and crisis management, and how that knowledge implicates the relationship between the nuclear hotline and its stakeholders.

The first narrative emerged in the 1950s as part of RAND analysts' attempts to conceptualize "requirements" for the success of U.S. deterrence (Kaufmann, 1989). These requirements included *capability*, *communications*, and *credibility*. Essentially, this narrative of "rational deterrence" acknowledged how any state developing nuclear weapons for the purposes of deterrence must also develop a regime that convinces its adversaries that two conditions exist. The first condition is a state's possession of nuclear weapons, as well as its strategic ability to deliver them in anger (i.e., capability). The second condition is a state's resolve to actually use nuclear weapons in response to an adversary's threatening behaviors (i.e., credibility).

Significantly, this narrative establishes communication as a *necessary condition* for effective deterrence. Deterrence cannot occur without communication, we learn, precisely because it requires a threat to be expressed and understood between adversaries, before its being acted on. The dreaded "failure" of deterrence, subsequently, is linked to the inability of this communication to convince adversaries that these conditions exist and that their existence is a sufficient disincentive to abstain from performing forbidden actions. According to this narrative, also, "communication" may occur in different forms. It may occur *discursively* through the spoken or written use of language (e.g., in press conferences held by national leaders). It may also occur, however, through their use of material or "nondiscursive" systems. That is, states often use nuclear weapons *themselves* (along with conventional military forces) to "make a statement" in conducting their deterrence relationships—for example, when they move weapons systems either closer to or farther from an adversary's national borders.

This variability is relevant because, in this narrative, nuclear hotlines *primarily* appear as a technological system for direct verbal communication that successfully maintains participants' perceptions of the capability and credibility surrounding each other's deterrent threats. Here, hotlines are "effective" if they enable their users to verbally resolve triggering conflicts without initiating or escalating a nuclear exchange. *Secondarily*, however, this narrative establishes nuclear hotlines as opportunities for verbal communication that may lead states to engage in related *nondiscursive* communication of deterrence.

Our second narrative of communication emerges in the discourse of NC3 systems planning, where "communications" is configured with other key functions of nuclear weapons command and control. Here, communication is almost entirely depicted in technocentric, mission-focused terms. The U.S. Department of Defense, for example, provides the following summary:

> NC2 is supported by a survivable network of communications and warning systems that ensure dedicated connectivity from the President to all nuclear-capable forces. The fundamental requirements of NC2 are that it must be assured, timely, secure, survivable, and enduring in providing the information and communications for the President to make and communicate critical decisions throughout the crisis spectrum. (Office of the Deputy Secretary, 2020, p. 22)

This document's authors subsequently elaborate "communications" as a technical matter of circulating information between network nodes:

> NC3 relies on terrestrial . . . airborne relay . . . and satellite . . . sensors to transmit and receive voice, video, or data. The ability to move trusted data and advice from sensors to correlation centers, from presidential advisors to the President, from the President to the NMCC, and from the NMCC to the nuclear weapons delivery platforms depends on NC3. . . (Office of the Deputy Secretary, 2020, p. 25)

In this way, the NC3 planning narrative primarily depicts communication as an abstract system capability, which supports its other NC2 functions (Larsen, 2019, p. 1). Submerged within this narrative, however, is a *competing* image of communication—not as a strategic capability, but as a *concrete political event*. This image arises in NC3 planning discourse that depicts communication as an activity that supplies nuclear decision makers with needed information resources. These resources, it is implied, facilitate some kind of event that produces a decision output, which forms yet another message for the system to transmit. *But what is this black-boxed event, if not also the situated practice by officials of communication* (i.e., discussion, deliberation, and debate)? In this way, reflexively, NC3 "communication" is not merely a *general* system activity; it is also a *specific, embedded occurrence*, whose outcomes form an artifact to be processed in that activity. This awkward coexistence of *different kinds of communication* in NC3 planning discourse is suggested in Shaheen's (2021) contrast between three different contexts of NC3 "information flow." These include a "vertical" flow of commands to and acknowledgments by military forces; a "horizontal" flow of information that serves officials' decision making; and an "institutional" flow, created by "bilateral and multilateral communication links called hotlines that are primarily designed for escalation control" (Shaheen, 2021, p. 153).

In different ways, each of these institutional narratives groups "communication" with similar-yet-also-different concepts. In turn, each prioritizes the relative importance of these concepts. That is, while there appears to be no exigency for ranking their importance, deterrence and NC3 speakers persistently do so, and with different outcomes.

In discussing deterrence theory, for example, some commentators deem credibility to be the "magic ingredient" of this strategy (Mälksoo, 2020, p. 2), emphasizing the supreme importance of an attacker's psychological state of belief concerning a defender's resolve (Klinger, 2019, p. 75). Other speakers, alternately, favor the component of capability, as expressed in Steff's (2020) summary of mainstream research findings:

> Clear communication is essential so that an adversary knows what one is willing to protect and the methods they are willing to use to do it . . . *Yet it is military force . . . that has generally been accepted as the essential component underpinning nuclear deterrence strategies*. (p. 58; emphasis added)

Still other speakers suggest the primacy of communication in this triad—for example, in Prior's (2018) claim that, for a deterring actor to establish credibility with an adversary, they must "communicate both capability and commitment" (p. 66; emphasis added). Occasionally, however, "communication" disappears entirely in these accounts—for example, in Larsen's (2019) conflation of it with "credibility" as the necessary condition of a "convincing demonstration":

> Deterrence requires *both the capabilities to threaten* what an adversary holds most dear, and *to convincingly demonstrate* to potential adversaries that one has the willingness to carry out the threat to use those capabilities. The combination *of these two elements* will theoretically dissuade or deter a rational actor from taking any first step toward war, by fear of the consequences. (p. 1; emphasis added)

NC3 planners express even greater ambivalence about communication. In a recent report summarizing stakeholder discussions, for example, CATALINK planners note that while many of its participants recognize the vulnerability of NC2 systems to attack, communication *"is not often considered part of a nation's NC3 superstructure"* (Nautilus Institute et al., 2020, pp. 4–5; emphasis added). In a revealing footnote (Nautilus Institute et al., 2020, p. 5, n.7), the authors explain further:

> Some [participants] have argued that *the concept for* [nuclear hotlines] . . . *should be separated completely from "NC3,"* which they say is specifically about positive and negative control of nuclear weapons. Acknowledging there is no global or agreed meaning to the term NC3, *we believe that nations' NC3 and communications systems are inextricably intertwined with each other's NC3 systems, a condition we call "global NC3 interdependence."* Hotlines . . . are born of recognition at the political level of this interdependence. . . Thus, *any conceptualization of a "nuclear communication" system should include international communications considerations and hotlines.* (emphasis added)

In citing these examples, our goal is not to resolve their variety by championing preferred distinctions or configurations. Instead, it is to highlight how these narratives interpret these concepts and their relationships differently—a condition that yields different implications for nuclear hotline development. In variations of the deterrence theory narrative, for example, communication is either a *subordinate mechanism* for achieving the other two, more important requirements of deterrence, or (more radically) *it is the superior requirement*, *upon whose functioning those other requirements depend for their success*. In the NC3 planning narrative, alternately, the uniquely social and political connotations of "communication" struggle for inclusion in a discourse whose conventional acronym *includes the very term "communication(s)"*! There appears no clearer example of how nuclear hotline discourse forms a site of struggle between competing meanings for "communication."

Limitations of Traditional Conceptualizations

We have argued above that dominant institutional narratives of the nuclear hotline produce differing and potentially opposing images of communication. We turn now to discuss about how this condition *matters* to hotline stakeholders. We focus on two limitations that may subsequently inhibit their shared understanding and collaboration: *the perpetuation of instrumental illusions* and *insensitive conception of mediated communication*.

Perpetuation of Instrumental Illusions

By now, it should be clear that nuclear hotline discourse primarily expresses the rational, technocentric worldviews of scientists, engineers, and military officials dedicated to managing nuclear deterrence and crisis (Rapoport, 1974; Taylor, 2019). To a significant extent, these worldviews share an orientation to the premises of cybernetics and structural-functionalism (Edwards, 1997). These premises include the automation of functionality to attain programmed goals, conformity between human and nonhuman elements, the exploitation of information to ensure both external adaptation and internal regulation, the inherent moral and political neutrality of technology, and the exclusive legitimacy of elites in developing national security systems.

As we have noted, these worldviews interact to reinforce a particular abstract conception of nuclear communication—one emphasizing its status as "information" generated by, and transmitted between, system nodes. In this conception, the primary "problems" of communication include "breakdowns" caused by channel "noise" degrading signal quality or other factors that prevent message receivers from accurately decoding intended meanings encoded by message senders. These paradigms align with a *sociopsychological* model of communication (Craig, 1999), which foregrounds cognitive traits and processes associated with individual processing of information, and rational choice of behavioral response. One premise of this model is that there is an "optimal" communication process that can "maximize" preferred outcomes among speakers.

While there are clearly benefits associated with this view of communication, we believe it possesses three limitations. First, it valorizes the technical *means* of communication, while emptying this activity of its *actual* properties, including *form*, *content*, and *significance*. As a result, this worldview may create blind spots among nuclear hotline stakeholders concerning the uniquely *practical* and *meaningful* qualities of that communication, as it is jointly enacted by those users in particular situations. Second, the prioritization of system *order* and *stability* in this worldview may lead nuclear hotline stakeholders to prematurely normalize and limit the range of communication practiced by those users. Here, the neglected question is *how* that practice should be designed and performed, to foster the development of both stabilizing norms and beneficial learning (Shaheen, 2021). Finally, the emphasis in this view on (if not fetish of) the functional needs of hotline users may blind stakeholders to its unofficial, more widely circulating significance. This potential is signaled by Egilsson's conclusion (discussed above) that, currently, most *demonstrated* hotline functions involve *its persistent symbolism for external audiences*, beyond its direct use in managing crises.

This condition raises the concern that nuclear hotline stakeholders may follow other security alerting systems in dubiously perpetuating "the appearance, but not the fact" of state efficacy in crisis management (Griffin & Miller, 2008, p. 167; see also Bean, 2019). Relevant here is Miller's (2020) conclusion that actual hotline arrangements often do *not* conform to the communication capabilities (e.g., automatic, direct) attributed to them. This imperative of achieving the appearance of reliability is, of course, central to the effectiveness of deterrence (e.g., in allaying public fears). But stakeholders rarely consider how this imperative may shape the development of communication systems within NC3 infrastructure. Understanding these implications becomes easier when we consider Bracken's (2020) observation that "communications" is an awkward and neglected "outlier" in deterrence discourse:

> Communications is . . . both a darling and a stepchild of deterrence. It is a darling because
> there's wide agreement that a country needs to communicate red lines that might trigger
> nuclear use. Yet it is a stepchild because most analyses overlook what is clear to the military—
> the biggest military vulnerability is often [NC3] communications . . . This vulnerability makes
> it a prime target, but one which at a strategic level no-one admits to. (pp. 2–3)

Here, Bracken acknowledges that NC3 stakeholders may respond to the intolerable knowledge of communication's fallibility by promoting preferred (even if unattainable) images of its viability. Our concern here is not simply that this image is inaccurate (although that is surely important), but that it creates the metaphorical equivalent of an institutional "allergy" to communication that affects the evolution of nuclear deterrence and crisis management. That allergy may continue to be triggered by innovations of the nuclear hotline, leading to its suboptimal configuration within the NC3 infrastructure. This undesirable outcome is signaled by Peters, Anderson, and Menke (2018) in their conclusion that "the United States has yet to develop a cohesive, comprehensive approach bringing together . . . the "three Cs" of deterrence: capabilities, credibility, and communication" (p. 17).

Insensitive Conception of Mediated Communication

Writing as a leading theorist of nuclear deterrence, Thomas Schelling (1966) concluded, "There is probably no single measure more critical to the process of arms control than assuring that if war should break out the adversaries *are not precluded from communication with each other*" (pp. 263–264; emphasis added). Few would disagree with this principle. Nuclear hotline history, however, indicates that this claim begs the subsequent question: "Communication in what form?" Here, we focus on potential limitations arising from dominant hotline discourse attributable to its limited conception of mediated communication. That is, while the discourses of deterrence theory and NC3 planning typically conceptualize communication in technical terms, this view may curb stakeholder appreciation for the unique role of *media logics and affordances* in shaping actual hotline communication (Chesebro & Bertelsen, 1999).

Here, we begin with the curious divergence between the popular image of nuclear hotline communication and its actual systems. As several commentators have noted (Aradau, 2016; Arms Control Association, 2020; Nanz, 2014; Simon & Simon, 2017), this image is embodied in the Hollywood myth of the "red telephone" that allegedly sits on the desks of nuclear-national leaders and is available for their immediate usage should events warrant. This image foregrounds the communicative drama of *orality* and *conversation*. In the related cultural plots of nuclear crisis, national leaders serve as *communicative heroes*, willing and able to undertake the arduous process of raising concerns, assessing each other's intentions and commitments, clarifying understandings, and confirming their implications. Ideally, this process leads to the rapid, improvised negotiation of agreements.

For at least two reasons, this image of communication technology has considerable appeal. The first is that it efficiently collapses the complexity of nuclear crisis management into familiar characters and practices of media culture (e.g., of cinematic dialogue). Second, it provides some psychological compensation for the dreadful aura exerted by another icon of nuclear deterrence—"the button" that expresses public fear that states will initiate unnecessary and irrevocable catastrophe (Plotnick, 2012).

Indeed, this influence is not limited to popular audiences: Egilsson (2003) notes that, in the 1980s, many U.S. State Department officials responded to the proposed inclusion of voice communication in the DCL by expressing their belief that this capability *already existed* (p. 4).

The persistence of this myth of orality in the face of institutional preferences for *written* communication (i.e., first teletype, and now e-mail) raises issues for the design and use of nuclear hotlines. Most importantly, it indicates that the "institutional allergy" we described above is an aversion to a particular *kind* of communication. That is, commentators agree that nuclear hotline designers have clung to the use of written media because those formats support desirable—and thus partly arbitrary—qualities of nuclear crisis communication (Aradau, 2016; Byrne, 2013; Egilsson, 2003; Nanz, 2014; Simon & Simon, 2017). These qualities include *accountability, authority*, *clarity*, *contemplation*, *coordination, deceleration, detachment, deliberation, dispassion, formality, precision, strategy*, *tangibility*, and *verifiability*. These qualities manifest in nuclear crisis discourse through images of highly choreographed, sequential exchanges of carefully composed, disembodied—and thus "official"—hotline statements. Collectively, these qualities support nuclear hotline communication as an *effective* and *controllable* phenomenon. Simultaneously, these images *remove* potential qualities of hotline communication deemed *undesirable*—arguably, because they represent excessive and relatively *uncontrollable* features of human interaction. These dispreferred qualities include *deception*, *delusion*, *distortion* (i.e., because of errors in oral translation), *emotionality*, *ephemerality*, *immersion*, *impulsiveness*, *inefficiency*, *informality*, *spontaneity*, *and unreliability.*

Our concern is that this tension does not merely indicate competing preferences for the format of hotline communication. Potentially, it also influences the institutional imagination of hotline requirements and functions that may prematurely exclude useful qualities of human communication. As noted in our introduction, for example, commentators have expressed alarm concerning the growing threats posed to the effectiveness of nuclear deterrence by technological innovations such as hypersonic missiles and artificial intelligence. A predominant theme in these accounts is the undesirable *acceleration* of decision making required for officials engaged in assessing and responding to nuclear threats. As a result, it is reasonable to question whether existing preferences for written hotline exchange may prove unsustainable under these conditions. If it is not, then designers of the nuclear hotline would do well to cultivate institutions that prioritize (e.g., through formal training programs and informal socialization) practices of human communication that achieve desired outcomes such as rapid trust, tactical improvisation, and efficient learning. Rich and Craig (2012), for example, argue that it was only through their creative use of *meta-communication* that U.S. and Soviet officials were able to escape the paradoxical double binds structuring the Cuban Missile Crisis.

Here, it is crucial that these qualities of communication not be conceptualized as abstract, cognitive processes occurring within isolated individuals, but as concrete outcomes of jointly enacted practices promoting situational coherence and collaborative relationships. The goal should not be to surrender nuclear hotline communication to the tyranny of speed, but to cultivate various media affordances enabling its flexible modulation of temporality. Current CATALINK design plans, for example, favor SMS text capabilities as a tradeoff between competing priorities of system bandwidth, information opportunities created by immersive multimedia systems, and the potential for those opportunities to be misunderstood or exploited for deception (Nautilus Institute et al., 2020, p. 28). While this choice seems reasonable, its effectiveness will ideally be assessed through empirical testing (e.g., in simulated hotline exchanges).

Conclusion: Elevating the Communicative Status of Nuclear Hotlines

In this essay, we have argued that conceptions of communication are *both* central to *and* underdeveloped in the history of nuclear hotlines. We have subsequently argued that the limitations of related narratives may undesirably constrain stakeholders in their innovation of this technological artifact. We conclude this essay by discussing potential benefits of revising these narratives. Here, we do not pretend to offer simple solutions to the challenges of nuclear hotline communication. Indeed, that communication manifests seemingly intractable dilemmas embedded in the structures of nuclear deterrence. These dilemmas arise from competing logics for managing international nuclear crises. Here, one logic prioritizes the design principles of *certainty*, *strategy*, *independent action*, and *control*. An alternate logic at least tolerates—if not prioritizes—those of *uncertainty, learning*, *adaptation*, and *interdependence*.

Nonetheless, further development of this project promises at least three benefits. The first is that it fills an existing gap in the communication literature by providing *some* discussion of this important (i.e., potentially world saving) technology. The second is that it usefully counters an ahistorical (and occasionally hysterical) tendency in current public discourse to emphasize threats posed to nuclear deterrence by "new technologies." While important, we believe this focus should not obscure the critical importance of "old" technologies such as the nuclear hotline. Third, our argument encourages scholars and other nuclear professionals to move beyond conventional gesturing toward communication as a mere "aspect" of deterrence (e.g., Prior, 2018, p. 66). Alternately, we have demonstrated that nuclear deterrence is an exemplary site of "metadiscourse" (Craig, 2013), in which cultural speakers and professional scholars contend over the theoretical status and practical implications of "communication." We have also demonstrated how this contest is activated in and through the development of technological artifacts such as the nuclear hotline. These findings advance existing arguments that nuclear deterrence is primarily—if not exclusively—a *communicative* phenomenon (Taylor, 2019).

How might we further explore the implications of this argument for nuclear hotline development and usage? Here, we propose two sets of questions that might spur further research by communication scholars and/or nuclear professionals. The first follows logically from our findings in this essay, and focuses on the nuclear hotline's sociotechnical dimensions:

- *Which nuclear crisis management systems do stakeholders (e.g., developers, designers, administrators, and users) regard as true "hotlines"?*
- *What affordances do stakeholders attribute as necessary and desirable features of nuclear hotlines? How do these affordances materialize particular norms, values, and beliefs concerning nuclear crisis communication?*
- *What influences contribute to differences among these stakeholder attributions?*
- *What benefits and limitations may result from resolving these differences and standardizing institutional conceptions of nuclear hotline communication? Alternately, which may result from sustaining these differences?*

Our second set of questions envisions scholarly access to observation of (presumably simulated) nuclear hotline usage, and/or to records of its simulated and actual usage. Researchers pursuing this access, however, face considerable challenges. As we have noted, states are strongly motivated to protect information about their hotline usage as national secrets. Thus, scholars cannot be certain which hotline events have been recorded, or whether those recordings are reliable. Certified and publicly available transcripts of these recordings are extremely rare; scholars must typically rely on indirect accounts provided in secondary sources. For these and other reasons, the analysis of nuclear hotline communication is significantly underdeveloped (see Simon & Simon, 2017). Nonetheless, we offer the following questions in the hope of inspiring communication scholars and nuclear professionals to create different research conditions:

- *How do nuclear hotline users learn (e.g., through programs of formal training and informal socialization) to perform related communication? Which norms, beliefs, and values about communication do these programs promote? Which do they marginalize and omit?*
- *How do the communication affordances of nuclear hotlines enable and constrain interaction between their users? To what extent—if any—do these users display creativity or resistance in their communication?*
- *What are the communication practices through which nuclear hotline users jointly achieve desired goals such as trust-building and collaboration?*
- *How do hotline users communicatively resolve dilemmas arising from competing preferences and conflicting goals (e.g., urgency and deliberation)?*
- *How might nuclear professionals incorporate communication research findings into ongoing hotline development?*

Potentially, further study of these questions may permit nuclear hotline stakeholders to share a particular goal: *the optimal configuration of interacting systems that comprehensively perform diverse communication practices required for successful nuclear deterrence and crisis management*. As a result, those systems may be better prepared to meet the growing requirements for "passing" the increasingly perilous "essay test" (Harvey, 2019) assigned to humanity by the post-Cold War nuclear system.

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Appendix: Hotline Agreements Between States Other Than the U.S. and Russia (1966–).

Participating States or International Governmental Organizations (IGO)	Host Units (where relevant)	Date Established	Primary Function (where exceptional)	Additional Notes
France–Soviet Union		1966		
Great Britain–Soviet Union		1967		
	Heads of State	1998		Prior, unofficial hotline terminated in 1969 following Chinese rejection of Russian contacts during frontier confrontation
	Respective Defense Ministries	2008		
United States–China		1998		Initially proposed by United States in 1973 before normalization of relations
Russia–Germany		1989		
Russia–NATO		2003		
India–Pakistan	Heads of State	2004		Agreement not yet implemented
	Directors General, Military Operations (DGMO)	1990		2004 agreement to update system not yet implemented
	Counterterrorism	2011		
				All programs subject to repeated suspension and resumption, according to status of participant relations

North Korea (DPRK)–South Korea (ROK)	Ministry of Unification (ROK)	Multiple programs established 1971–2018	Inter-Korean Liaison; Conference Support; Maritime Authorities; Inter-Korean Joint Committee of the Kaesong Industrial Complex, Inter-Korean Joint Liaison Office	All programs currently nonoperational
	Ministry of Land, Infrastructure and Transport (ROK)	1997	Air Traffic Control	
	Ministry of National Defense (ROK)	2002–2003	Military Telecommunications	Currently nonoperational
	United Nations Command	1998		
	National Intelligence Service (ROK)	2000		
	Blue House (ROK)	2018	Heads of State	Currently nonoperational
South Korea–China	Defense Ministries	2008; 2014	Defense Chiefs	Original hotline limited to naval and air forces
India–China	Heads of State	2010		
	Armies	2018		
Vietnam–China	Ministries of Foreign Affairs	2012		

Taiwan–China	Mainland Affairs Council (China); Taiwan Affairs Office	2015	Cross-Strait Relations
United States–India		2015	

Note. Compiled from: "Arms Control Association" (2020), Egilsson (2003), Hannah (2018), Miller (2021), Moon and Boo (2021), and Suri (2018).