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How Disagreement Over Space Terms Can Create Barriers to Transparency in the Space Domain

Prepared for
Strategic Multi-Layer Assessment
Contested Space Operations

Sabrina Pagano, Ph.D., NSI
spagano@NSIteam.com

John A. Stevenson, Ph.D., NSI
jstevenson@NSIteam.com

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Introduction

Everyone knows that space situational awareness (SSA) is difficult.[1] Characteristics of the space domain that distinguish SSA from situational awareness within other domains are the remoteness of space and the presence of naturally occurring threats in the space environment. The distance and speed at which satellites operate make inspection, tracking, and assessment of damage source and extent difficult. The space environment also presents many naturally occurring threats that could at times be attributed as deliberate attacks. These include meteors and fragments, as well as sun flares and other inclement space weather that can damage or destroy satellites or their electronic systems.

In short, the remoteness of space means that adverse events are occurring all the time in an environment in which *direct observation* of the causes of those adverse events is extremely difficult. Efforts to independently 'trust, but verify' that adversaries may not have caused adverse events are hard to establish. The limited ability for direct observation could result in invalid inferences that an adversarial action is occurring even when it is not.[2] For example, space actors may struggle to determine whether detected damage to spacecraft is due to an intentional attack, an accident, or even a natural occurrence in the space environment. In fact, without direct observation, actors in the "congested, contested, and competitive"[3] space domain instead rely on other methods of making inferences about the causes behind adverse events, including communicating with each other. As a result, miscommunications that lead to incorrect inferences about the causes of adverse events can pose great risks to stable governance and crisis management in the space domain. Space actors must be able to credibly communicate that their actions were not the reasons that bad things happened to another actor's space assets.

One solution to reduce the risks of misperceptions from limited SSA is creating *transparency* through communication among space-faring nations by sharing SSA-relevant information, particularly in times of crisis. This is depicted in Figure 1. Transparency in communication helps reduce risk because transparent communication, according to space experts, can be an important tool for mitigating or avoiding conflict

[1] See the NSI Space ViTTa® Q17 report conducted for SMA on multi-domain conflicts: Multi-Domain Conflicts: Is US Success Contingent on Dominance in Every Domain? at http://nsiteam.com/sma-publications. See also Jafri, A. & Stevenson, J. (2018). NSI Concept Paper, Space Deterrence: The Vulnerability-Credibility Tradeoff in Space Domain Deterrence Stability,. Arlington, VA: Strategic Multi-layer Assessment (SMA).

[2] As theorist Robert Powell points out, a minor accident might "set the dice rolling," but for a crisis to escalate further, it must be "followed by a series of interacting decisions" that are deliberately aimed at escalation, invoking pre-planned response options to contingencies.

[3] Ambassador Schulte, G. L. (2011). Address at the *27th National Space Symposium.* Colorado Springs.

spirals that can occur based on misperception.[4] While transparency in space alone "does not directly ensure space security, it can be an aid to the maintenance of norms and disincentivizes the possibility of a kinetic military action," space and policy advisor Massimo Pellegrino (formerly of United Nations Office at Geneva) observes.

An under-appreciated (and under-theorized) aspect of this process of creating transparent communication is the key space terms used to describe events and causality in the space domain. Key space terms shape and reflect how actors ascribe intentionality and describe threats within the space domain. As such, agreement on key space terms constitutes an important aspect of operating in the space domain—one that has gone largely unrecognized. In this Concept Paper, we argue that disagreement among authorized representatives[5] of space-faring nations over key terms related to events in space form barriers to creating communication transparency.[6] While the consequences of these discrepancies in the use of key space terms are in some cases benign, in other cases, disagreement over key space terms can negatively impact US national security. This is likely when these disagreements stifle effective, transparent communication among space actors, particularly in the face of adverse events about which space actors have limited SSA.

[4] For a review of the experts promoting transparency, see the NSI Space ViTTa® Q10 report conducted for SMA on the effects of investment on space security.
[5] Authorized representatives are those interlocutors who interact on behalf of their nation states in ways that can shift that country's space policy, whether those are policy people, politicians, heads of state, etc. See the NSI Space ViTTa® Q10 report conducted for SMA on the effects of investment on space security. Respondent Dean Cheng of the Heritage Foundation tartly noted that different countries authorize different kinds of interlocuters to speak authoritatively on their behalf. In China, for example, the Foreign Ministry is "irrelevant" and the Chinese Communist Party Politburo only can make official statements, whereas in Japan only representatives of the Prime Minister's office have authorization to speak authoritatively.
[6] This work was completed as part of the 2017-2018 SMA Space effort. See the NSI Space ViTTa® Q18 report conducted for SMA on the principles of response to aggression in space.

Inconsistent Use of Key Space Terms Limits Transparency Among Space Actors

Key terms and the concepts they represent are the foundation of the kinds of communication necessary to overcome the barriers introduced by limited SSA. Terms are given meaning both by the speaker and the listener. A lack of common usage and understanding of key space terms can create or maintain existing barriers to transparent communication "even where there are no basic incompatibilities" in actor preferences (Fisher, 2000). A lack of common usage and understanding of language can manifest in multiple ways, including when speakers use different words for the same concept or the same words for different concepts.[7] These forms of disagreement are the most easily observed form of disagreement over key space terms, and create barriers to information-sharing and transparency in the space domain.

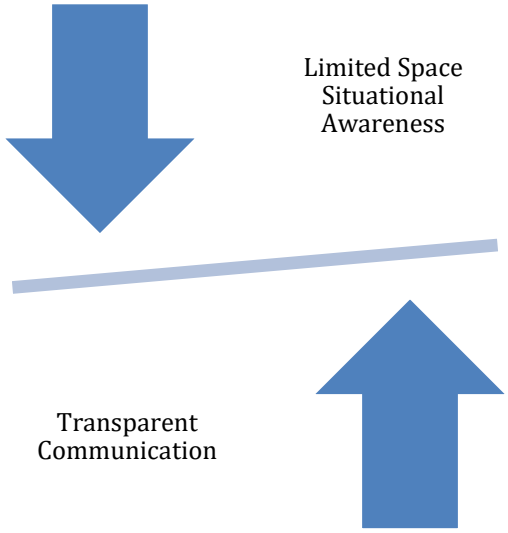

Figure 1: Managing Misperception and Crises in the Space Domain

Detecting variations in language usage for key space terms is impeded by a common cognitive bias, known as "naïve realism." Naïve realism describes the human tendency to believe that the way we see the world is based in an external "reality," rather than a reality that is filtered through our internal expectations and perceptions.[8] As such, actors are prone to believe that others are using key space terms in the same way that they are, when in fact this may not be the case.

A simple example can be used to illustrate this bias in a low-stakes situation. Suppose that someone shares with a colleague that is also taking lunch outside the observation that the temperature is "hot" today. She may assume that her interlocuter shares the same conceptualization of "hot." Yet, she may define a "hot" day as 80 degrees and humid, whereas a second person may define a hot day as 100 degrees and dry.

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[7] This discussion, while acknowledging the additional complexity that can be introduced by issues of translation from one language into another, focuses on cases where translation itself is not the source of variation.

[8] Naïve realism falls into the broader category of cognitive biases (for more information, see: Jones & Nisbett, 1987; Robinson, Keltner, Ward, & Ross, 1995; Ross & Ward, 1996).

However, when these individuals speak to one another, the discrepancy in their conceptualization of "hot" temperature may not be apparent to them. Rather, they assume that the words they are using have shared meaning.

In the example above, the two individuals are using the same word (hot) to indicate different conditions (hot is 80F and humid vs. hot is 100F and dry). Their concept of "hot" differs and thus so does their usage of the related word, despite using identical terms. This example is a metaphor for similar processes of disagreement over key space terms, the effect of which is to limit transparency. To illustrate the potential pitfalls for national security from barriers to transparency, let us proffer the example of the terms "space weapons" and "armed attack."[9]

The concept of "space weapons" is one of the more commonly acknowledged space terms with multiple usages indicating different concepts. As part of NSI's Virtual Think Tank (ViTTa)® expert elicitation on space terms,[10] Victoria Samson of the Secure World Foundation, noted that the way "space weapons" is commonly used, "it could be defined so generally that everything is a space weapon or so strictly that nothing is a space weapon." Disagreement about this key space term could easily allow for different states to perceive the same capability or object in very different ways based on the ways that they define "space weapon." Such terminological disagreement—particularly when unacknowledged due to naïve realism—limits the transparency in communication necessary to convey, for example, that a given state is not seeking to deploy into space any capability it understands as a weapon. It is via this mechanism that disagreement over key space terms can ultimately negatively impact US national security.

Consider next the example of an actor maneuvering its own spacecraft in proximity to an adversary's in order to observe something that was launched in space. We offer this example to illustrate the processes by which using different key space terms to describe the same event creates barriers to transparency. The activity of approaching another spacecraft is legal as it falls within the bounds of "free access" under the Outer Space Treaty. Yet, given limited SSA, the discrepancy in the terms actors use to describe the *intent* behind the craft's approach can limit practices designed to create the necessary transparency to avoid conflict spirals stemming from accidents and misperceptions. For instance, in this case, the actor doing the observing may label this activity as "onsite verification," but the surveilled satellite's operator may instead perceive and thus label the activity as "attempted sabotage." The actors' deployment of space

[9] This discussion is adapted from the NSI Space ViTTa® Q1 report conducted for SMA on contentious terms in the space domain: Taking Up (Outer) Space: An Exploration of Definitional Issues

[10] See NSI Space ViTTa® Q1 report conducted for SMA on contentious terms in the space domain.

terms reflects different interpretations of the potential range of attributions for the same action (approaching another spacecraft).

For further illustration, let us assume that there was no disruption or disabling of the spacecraft; in other words, that the approach did not correlate with a malfunction of the spacecraft in any way. Once the action of approach occurs, however, the surveilled actor's perception is that the action is threatening. In this situation, there is a marked variation in what each actor considers the purpose of the approach activity that may be indexed, in part, by the space terms each actor uses to describe that activity.

The term space weapons is not an isolated example of the potential for terminological disagreement to limit transparency in communication. NSI's Space ViTTa work also reveals discrepancies in the use of other terms used to describe events in space, such as what constitutes an "armed attack," or relatedly, "[harmful] interference" or the "use of force" in space. As Jack Beard of the University of Nebraska College of Law queries, "Is making a satellite wobble out of its projected orbit an illegal 'use of force?' Is it 'interference'?"[11] As actors attempt to depict the event—a satellite wobbling in orbit—using key space terms such as "use of force" or "interference," barriers to transparency emerge from the differing use of terms.

Disagreement over key space terms occurs when representatives use or define terms referring to space events in different ways. Dr. Mark Sundahl of Cleveland-Marshall College of Law argues space term inconsistency generates "uncertainty that affects our operation in space", and this inconsistency stems from unidentified "terms, restraints, and legal terms in the treaties present.[12] This disagreement is likely to proliferate as the number of space actors increases, bringing with them a greater number and anticipated variation in perspectives on interactions within the space domain.[13]

Awareness of Terminological Discrepancies is the First Step Toward Greater Transparency

Limited SSA make efforts to independently 'trust, but verify' activity difficult, leaving actors with two methods of understanding the activity-event: transparent communication with each other and their own

[11] As Beard further notes: "'Interference' is a hugely debated and controversial term because it appears to be prohibited, but there is no definition of it—there is no authoritative definition of 'interference' in any international agreement except in the context of radio communications. And there's a real problem between where interference ends and something allowing an armed response occurs."

[12] See the NSI Space ViTTa® Q21 report conducted for SMA on verifiable norms: Developing Verifiable Norms in Space: Enforcement as Verification, and the Problem of Dual-Use at http://nsiteam.com/sma-publications.

[13] As one example, cultures vary in the degree to which they are likely to attribute observed actor behavior to situational versus dispositional causes (Choi, Nisbett, & Norenzayan, 1999).

attributions, absent any dialogue. Disagreement in the use of key space terms limits the effectiveness of the former approach. Naïve realism undercuts the utility of the second method.

NSI's Space Virtual Think Tank (ViTTa)® SME elicitation effort indicates that variation in the use of language can be recognized or unrecognized. In cases where expert respondents were not aware that there are different ways of thinking about key space terms, they naturally cannot anticipate this issue and address it in advance. Awareness, then, can be an important first step to mitigating this communication barrier. Awareness begins when actors refrain from assuming that others share their own use and understanding of key space terms. Speakers can identify how and when they are using language in different ways from one another if they engage in an active process of communication regarding the words they use and the concepts to which those words refer, which will provide these actors with the opportunity to identify discrepancies.

Imagine that the earlier example had begun with the two actors using the key space term of "onsite verification" in identical ways, following a process of initial information sharing. Both actors' use of the term "onsite verification" would refer to the same set of actions. If the spacecraft maneuver fell outside of these actions, then the surveilled actor would know with greater certainty how to infer intention and thus what attribution to make. Agreement on the key space terms promotes transparency between states and enables them to come to agreement regarding the intentions behind an action or event. Similarly, if the spacecraft maneuver instead fell inside the defined set of actions, the surveilled actor would once again have transparent insight into the other actor's benign intent and could refrain from responding aggressively to the observed action.[14]

Conclusion

Absent a common approach to space terms that is consistently used across actors, "a heterogeneous society" such as the increasingly diverse set of actors involved in space, "will have a much more difficult time addressing…problems" due to barriers in understanding and cooperation (Sunstein, 2018). In contrast, achieving common usage and understanding of key space terms ultimately enables transparency between actors in the space domain—that is, agreement allows for actors to more accurately convey their intentions, actions, and capabilities.

[14] While mutual usage and understanding of key space terms is important among allies, it is even more important among adversaries, as their negative history of interaction is likely to create expectations that bias perceivers to "see" threat, even where threat is not intended.

Of course, multiple actors, including the US, may resist clarification and codification of certain key space terms used in the space domain, as this ambiguity may be seen as strategically useful. Consider the potential utility of maintaining ambiguity in the phrase, "peaceful purposes," which is included in Article IV of the Outer Space Treaty (OST). The meaning of peaceful purposes may be debated when invoking space activities such as militarization (which by most accounts has already happened) and weaponization (which by some accounts has not yet happened). As the US may want to remain unhindered in its space activities, it may want to resist coming to common usage and understanding of the term, which may desirably limit others' options, but undesirably limit its own options.

However, the increasingly "contested, congested, and competitive" nature of space suggests that the strategic benefit of clearly operationalizing terms and coming to common usage and understanding is beginning to outweigh the strategic benefit of avoiding doing so. The benefit to the US of assuming leadership is two-fold. The first benefit is reducing the barriers to transparency that disagreement over key space terms create. The second is the opportunity for the US to be at the forefront of setting the standards for important space terms. As we noted in our Virtual Think Tank (ViTTa)® elicitation examining expert opinions on space terminology and definitions,[15] "the true power of definitions [words] lies in their ability to facilitate communication within and across groups and states operating in space and, ultimately, in their ability to facilitate the achievement of US goals, including the maintenace of stability in space."

[15] See the NSI Space ViTTa® Q1 report conducted for SMA on contentious terms in the space domain: Taking Up (Outer) Space: An Exploration of Definitional Issues

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