Time and Causality in Media Effects

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1. Media Effects: Relevance, Research History, and Current Research Practice

Motivated by the deep transformation of contemporary societies towards mediatization and digitalization, communication science has grown dynamically in the recent past (Donsbach, 2008). Specifically, research on the effects of mediated communication on individuals, groups, and society has been flourishing (Oliver et al., 2020). Internet communication and social media have been implicated in societal polarization and threats to democracy and lauded for their capacity to mobilize the disenfranchised; media content has contributed to the acceptance of racial and sexual minorities in much of society and to anti-minority backlash in others. Healthcare, commerce, and other key societal sectors are shaped by the impact of information and media content on consumers and citizens. Given the dynamic evolution of (digital) media platforms and ecologies worldwide, the history of expansion that communication science has seen regarding diverse media effects is most likely to continue in the years to come.

Accordingly, how media messages influence audiences‘ information processing, knowledge, attitudes, emotions, and behavior will remain key questions in the field of communication. Significant theoretical progress has been made across the traditional key themes of the discipline – news and political communication, entertainment, and persuasive communication. The rise of digital and platform media has dynamized the field further – vast numbers of more recent studies have addressed the effects of video games, social and mobile media, and streaming content. At the same time, also research designs, measures, methodological infrastructures, and routine operations in media and communication effects research have undergone a fundamental change. For instance, the differential susceptibility to media effects model (Valkenburg & Peter, 2013) and reinforcing spirals theory (Slater, 2007) have paved the way towards a more nuanced, dynamic, and process-oriented understanding of media effects, with novel methodological and data-analytical strategies following swift. Innovative digital methods promise to capture micro-instances of media effects “in situ” or at high temporal resolution (e.g., Freytag et al., 2021; Valkenburg et al., 2021). In terms of field organization, the massive expansion of media effects research has come with an increasing number of journals and publications and, consequently, a growing diversity – if not fragmentation.

As a consequence of these developments, a new need to build common ground for future media effects research has emerged. What are the epistemological, methodological and best-practice foundations on which future empirical scholarship on the manifold consequences of media use should rest? The importance of precisely explicating such foundations is rooted in the fact that much-published research on media effects addresses the key fundamentals only implicitly or not at all: Time and causality.

Some general principles of temporality and causality are common sense in media effects research. For example, experimental studies that test the causal effect of (manipulated) message attributes on (cognitive, affective, or behavioral) outcomes will always keep the only meaningful temporal sequence of presenting a message first and assessing outcome variables afterward. Longitudinal studies make use of the same sequencing logic to determine long-term dynamics that follow (earlier) message consumption.

Beyond these common-sense principles, however, a broad spectrum of open questions concerning time and causality remains that scholarship should provide answers to. One simple example: Experiments can demonstrate causal message effects by showing that if people consume a message that contains attribute X, they are more likely to display a particular outcome compared to people randomly assigned to consume a message that does not contain X. But would people in the first group have voluntarily selected the message with attribute X? Does their forced exposure make a difference for (causal) message effects?

A simple example from the pool of questions about temporality pertains to when precisely a causal effect of message consumption is (theoretically) plausible to materialize: Does the effect (e.g., a certain behavioral intention) occur immediately or with a certain delay? And what about understanding the temporal and causal processes that operate during the processing of media content when such content is used as an experimental stimulus?

The Herrenhausen workshop on time and causality in media effects research has brought together senior scholars from nine countries to develop a systematic collection of challenges, observations of emerging novel and valuable research practices, and ideas for collective innovations that may push the entire field to address issues of temporality and causality in theoretically and methodologically better ways. The present position paper summarizes the progress achieved during the workshop and from the consolidation of the event's documentation (sections 2 and 3). By the same token, it outlines the follow-up activities that workshop attendants and further invited scholars who could not visit the event have agreed on to infuse the learnings and ideas into the field of communication science (section 4).

2. Challenges of Temporality in Media Effects Research

2.1. Explicating the Theoretical Meaning of "Time"

For any instance of media consumption, time is a fundamental characteristic. Reading a news article, watching a movie, listening to a podcast are all media use behaviors that consume time and that happen at certain (points or periods in) times. Effects of media consumption also have temporal attributes; some effects may materialize instantly (while message contact is happening), immediately after message contact (e.g., extension of one's knowledge obtained from the completely consumed message), or with some delay. Moreover, media effects research is oftentimes not interested in single message effects, but accumulated consequences of multiple episodes of repeated exposure to the same message (e.g., advertisements) or theoretically similar messages (e.g., video games portraying violent acts). Such accumulation and its effects also feature temporal characteristics; for instance, "chronic" use of violent entertainment content may lead to stronger anti-social personality attributes over the course of years (Slater et al., 2004).

While temporality is theoretically important to virtually all media effects research, existing theories and empirical studies vary significantly regarding their explicit consideration of what time means and does in a given research context. For example, a "decay" of a media effect over time (Thomas, 2022) may not so much reflect a consequence of time itself, such as a fading-out of a certain impression a message had on a given audience member. Rather, the time in which the decay occurs could theoretically mean that novel experiences that the user

goes through after contact with the message under study will overwrite what the person has 'taken away' from the message in their short-term or long-term memory. Hence, "time" would rather function as a theoretical placeholder for unknown forces that influence an audience member after message contact.

A related theoretical vagueness that we often find in temporality reasoning of media effects researchers is the use of the labels "short-term" and "long-term". Implicitly, much work follows the common sense principle that "short term" media effects can and must be studied experimentally with a focus on single message exposure, whereas "long-term" effects research typically employs longitudinal research designs that span periods of days, weeks, months, or years (e.g., Vandenbosch & Eggermont, 2016). Yet, there appears to be no explicit consensus on the duration of "short-term" versus "long-term" patterns of media effects; and only some theoretical approaches offer explicit bridging assumptions to link "short" and "long-term" manifestations of effects (e.g., the Reinforcing Spirals Theory; Slater, 2007).

Improving the theoretical elaboration of the meaning of time in given research contexts will be necessary to improve the explanatory power of conceptual models of media effects, the empirical contribution that thematic studies will be able to offer, and the generalization of study findings to the (temporalities) of real-world audiences in their daily life.

2.2. Specifying Temporal Attributes of Media Effects Under Study

At a lower level of abstraction than time's genuine theoretical importance (see 2.1), formal expressions of media effects models will benefit substantially from greater specificity regarding assumed and testable temporal patterns. Future modellings of media effects should rest on more elaborate considerations of a broad spectrum of temporal dimensions, including

- Ordered relations: Which construct precedes and causes another?
- Sequences: What is the precise order of events that are independent of one another?
- Feedback loops and spirals: How do events influence each other reciprocally over time?
- Entrainment: How do two processes align over time?
- Growth and decay: How do phenomena change over time?
- Delays: How long does it take for an effect to emerge?
- Duration: How long does an effect persist?
- Stability/Flexibility: Are phenomena consistent over time or do they vary?
- Ruptures: Do phenomena change suddenly due to an internal or external event?

(Brinberg & Lydon-Staley, 2023; for another approach to time in communication research, see also Stanyer & Mihelj, 2016). Qualifying theoretical assumptions about a media effect in terms of such temporal characteristics will lead to dramatic increases in conceptual precision and assist empirical researchers in trimming designs and procedures towards adequate 'timing' of capturing effects (see also 2.3). Such time-related elaboration may also turn out helpful in understanding (on average) 'weak' media effects or the (presumably) many instances in which media effects have not been secured empirically (e.g., Nanz & Matthes, 2022). To illustrate the potentials, one may consider antagonistic processes that underlie a given media effect, such as attention to a policy theme that news media have put onto the population's agenda (Coleman et al., 2009). In a given audience member, a cumulative build-up of attention to the policy theme over time may occur as one such process ("growth"),

whereas forgetting due to manifold other news exposures may be a (permanent, temporally invariant) antagonist, which may result in a specific temporal pattern of when and how long an agenda-setting effect will materialize. Specifying temporal patterns of effect-driving and effect-diminishing processes should not solely focus on outcome variables (such as attention or awareness for a news theme in the example), but also cover the time patterns of message exposure (which may equally feature various and complex elements such as periodicity, congestion in time, or growth/decay). Ultimately, connecting the temporal features of message exposure (patterns) and effects processes will lift the parsimony of future media effects theorizing to a new level.

Because a wide array of aspects may be relevant to the temporal characteristics of a given media effect, an expanded community dialogue is advised to develop a framework of orientation that can guide well-structured and conceptually adequate consideration of temporality in future theorizing.

2.3. The Timing of Detecting a Given Media Effect

Finally, empirical studies implemented to observe a given media effect require design decisions related to time. Much published media effect research appears to remain implicit about the reasoning behind the choices made in this regard or to adhere to practices known from previous similar works that are not justified by theoretical assumptions. A good example is the choice of interval lengths in repeated-measures, longitudinal survey studies. Oftentimes, scholars seem to set these intervals to fit to a (funded) project runtime (e.g., three waves of measurement with an interval of six months so that data collection is completed within one calendar year), but not based on theoretical assumptions about the temporal patterns inherent to the phenomenon under study.

As a consequence, a significant portion of past media effects research may have followed inadequate (implicit) assumptions about inherent temporalities so that the valid capturing of magnitudes or even directions of given media effects may have been compromised. Future best practice in designing media effects studies should hence continue the theoretical improvements suggested above (2.1, 2.2.) to the workflow of empirical research and make sure that planning investigations contains well-defended choices regarding the temporalities of importance. For instance, research designs should mirror theoretically explicated assumptions on the latency and duration of the effect of interest so that the timing of measurement is actually suited to capture the hypothesized effect. Depending on theoretical assumptions, it might be advisable to administer a questionnaire for measuring outcome variables after a (specified) delay period to participants of an experimental media effects study. Likewise, longitudinal survey researchers should make conceptually justified choices on the ‘right time windows’, such as the frequency of measurement of duration and dosage of message exposure, as well as the timing of the assessment of outcome variables and mediators.

From these considerations, a continued conversation among the research community is encouraged to develop orientation guidelines for more adequate and explicit reflection of timing decisions in future media effects research.

3. Challenges of Causality in Media Effects Research

3.1. Locating the Theoretical Origin of Causality: Bridging Person-Specific Media Choice and Media Effects

The theoretical history of media effects research is dominated by a focus on causal consequences of *message* attributes. Prominent concepts such as the Elaboration Likelihood Model (Petty & Cacioppo, 1986) or Gain- versus Loss-Framing (e.g., O'Keefe & Nan, 2012) have mostly been applied to media effects studies to identify which message characteristics (e.g., types of storytelling) would have a causal effect on "the audience".

Along the same line, empirical experimental media effects research has relied for decades on the logics of confronting study participants with messages that were designed and manipulated in theoretically meaningful ways in order to observe causal consequences on outcomes of interest. Applying the logics of randomized controlled trials, this paradigm inevitably fails to do justice to the simple fact that in reality, the vast majority of media consumption follows individual users' choice decisions. Experimental media effects research, however, relies on forced exposure and does not leave consumption decisions to study participants so that effective randomized assignment to experimental conditions is retained.

In the field's history, research perspectives on individual media choice have most often been investigated separately from the media effects paradigm and treated the selections that users make (or do not make) as explanandum of its own right (e.g., Hartmann, 2009). More recent theoretical innovations have emphasized that media effects are dependent on individual choice decisions (and hence, on voluntary versus forced exposure) and also moderated by person and situation characteristics. Substantial variation in the outcomes of media consumption must be attributed to differences among people consuming the same message (Valkenburg & Peter, 2013) or to features of the social situation in which consumption is enacted (Schnauber-Stockmann et al., 2025).

Selection and moderation effects of person and situation variables will hence complicate any meaningful theoretical account of media effects, which includes the challenge to actually locate the origin of causality between selection, moderation, and genuine message variables. What has been previously suggested as a (non-)effect of message attributes may thus be re-theorized as a more complex interaction of (non-)selection, moderation, and message factors. One important challenge to the field is therefore emerging with regard to explicating the actual causal origins of "effects" phenomena.

To achieve progress, existing approaches such as the Differential Susceptibilities to Media Effects Model (Valkenburg & Peter, 2013), its reformulation as "person-specific" effects paradigm (Valkenburg et al., 2021), or the Reinforcing Spirals Model (Slater, 2015) need to be more widely adopted and refined in future concept work. One illustration (elaborated during the Herrenhausen workshop) is the so-called "AMOR" (Audience – Message – Orientation – Response) notion that highlights the potential interaction dynamics between person and message attributes, including the contingency of selection effects (voluntary versus forced exposure versus ineffective avoidance of a message).

One theoretically important case of application of this innovation perspective is that locating the origin of causality of a "media effect" should include a theoretical assumption on whether

an effect will occur by conscious intention of the media-using person, against their conscious will (but outside of their control), by their deliberate admitting, or any other conceivable form of (non-)contribution of the person to the media effect. Hence, reviving a Menschenbild discussion on how active and deliberate media users are conceptualized will contribute to more complete understandings of causality origins (Kahneman, 2011; Katz et al., 1973). One example for empirical consequences of deliberating the outlined challenge could be that future experimental work that shows a certain message effect for a certain group of people should be augmented by media selection research that tests whether that particular group (or kind) of people is actually likely to consume the type of message from which the demonstrated effect originates in real life.

3.2. Theorizing Causalities Beyond Single-Message Exposure and Effects

A considerable portion of media effects research looks beyond phenomena bound to single message exposures and instead adopts a perspective on causal connections between accumulated, multiple-episode consumptions of (the same or theoretically similar) messages and (long-term) outcomes, so called "drip" effects (Thomas, 2022). An example is the effect of cumulative news use on political knowledge (e.g., Kenski & Stroud, 2006). Causality seems to be difficult to locate within such cumulative, lengthy phenomena; for instance, does each "drip" contribute equally to the mounting overall effect on outcome variables, or are there critical thresholds (e.g., onset of the effect only after n = X messages received), non-linear accumulation dynamics (e.g., a flattening curve that reflects the association between the dose of consumed messages and value of the outcome variable), or other particularities related to (time and) causality?

Concerning the contemporary realities of media consumption, isolating individual acts of message consumption has become a challenge in itself, given the (nearly) permanent, oftentimes multi-tasking, behavioral patterns of mobile-digital media use via smartphones and other devices (e.g., Vorderer et al., 2017). One conceptually challenging aspect of such "always-on" media use is the enormous diversity of single messages that many users come across even during short episodes of screen time – switching between brief snippets of entertainment content, news alerts, personal chat conversations, and commercial advertising within seconds. Quantifying and qualifying the "dose" of messages that a given person is exposed to is not only an empirical-methodological challenge (see 3.3.), but also an inherent difficulty for locating causalities in theoretical accounts of media effects. For instance, many studies in the booming field of research into social media use and well-being rely on rather generic conceptualizations of "media use", with limited differentiations between types of messages that a given media diet contains (Meier & Reinecke, 2021). Behind overall media doses (e.g., screen time per day), however, lies a vast person-bound and situation-bound diversity of consumed messages and experiences that (somehow) play into the causality mechanics of the effects on outcomes such as (daily) well-being.

Finally, cumulation perspectives on media effects display conceptual challenges regarding the nature of effect *materializations*. Much past work has adopted a difference- or change-focused view in which the observation of a media effect was tied to (hypothesizing) a shift in an outcome of interest due to media use. For instance, higher cumulated exposure to pornography has been theorized to affect long-term sexual satisfaction by means of negative change (reduction) (e.g., Wright et al., 2017). The same (meta-)logics have led media effects

scholars to conclude null effects of media if no change (or difference in experimental group comparisons) had been observed. What has received considerably less theoretical (and methodological) attention in past work is theorizing of *non-change* as a media effect. Stabilization (Long, 2023) or suppression of change of an outcome variable (that would have occurred without message exposure) are notoriously underconsidered phenomena that deserve more debate in the community (Shehata et al., 2024; Weber & Popova, 2012).

3.3. Challenges of Theorizing and Demonstrating Causal Process Chains in Media Effects

One meta-conceptual perspective that has received broad attention among media effects researchers over the past decade is a focus on "mechanisms", that is, the assumption that a causal media effect can be understood with greater resolution or detail by including a process of transmission into theoretical models and empirical tests. Variables that function as transmitter of an independent (message) variable's causal influence to an outcome of interest (i.e., mediators) enrich theoretical propositions and enable explanations of why a given media effect actually occurs.

While mediation has added significant substance to much media effects theorizing across various thematic domains, both conceptual and methodological challenges related to inherent causalities remain to be addressed by the field. In conceptual terms, one key problem is modelling causality and message effects when those effects are assumed to influence subsequent message processing, that is, when variables are hypothesized to function both as "cause" and "outcome". Such causal process chains involving multiple communication events and hence sequences of effects – or in other words, dynamic process models – come with the challenge of potentially elapsing origins of causality. In such dynamic models, causal impact needs to be reframed as a process characteristic, not as a fixed result, which points back to temporality-related challenges (see above: 2.).

In methodological terms, past empirical work appears to handle mediation assumptions only in an incomplete, short-cut fashion, because many (experimental) designs fail to demonstrate the entirety of assumed causal steps of effect transmission. Many experiments test hypotheses of mediation effects although their design can only show a causal effect of the independent variable (e.g., a message attribute) on the mediator variable; because the mediator and the outcome variable are typically measured by the same questionnaire, the causal effect of the mediator onto the outcome cannot be shown (e.g., Freytag & Possler, 2024). Establishing full causality in mediation process chains hence remains as an important task for setting (future) best practice standards in media effects research.

Finally, sequence perspectives on transmission of causal effects in communication science are also in need of de-linearization: The analytical focus on certain message attributes, selected mediators, and outcomes should not lead researchers to overlook relationships among the very same variables that may be of theoretical-empirical relevance and indicate alternative or more complex causality configurations than (simplified) models would expect. For instance, mediator variables may not necessarily only be affected by an independent variable (e.g., a message attribute), but also *interact* with the very same independent variable to generate (causal) influence on an outcome (Holbert et al., 2024). Creating conceptual openness to such complexities and establishing methodological-analytical procedures to address them empirically are thus suggested for the field's innovation agenda as well.

3.4. Opportunities to Improve Causality Testing in Empirical Media Effects Research

Over the decades-long history of empirical media effects scholarship, many incremental improvements to basic designs and procedures have evolved. Not surprisingly, not all recent studies mirror that progress; communication science as a field does not know what some people in the field already know. With the large and still growing number of scholars and their remarkable productivity, one important pathway towards improving the field's capabilities in theorizing and investigating temporalities and causalities around media effects is to work towards a wider, consistent, and persistent adoption of methodological recommendations that are already known. In addition to developing innovative perspectives (along the lines of the previous sections), media effects research will benefit from guidelines or checklists that summarize important knowledge on evolved procedural practices with which (young) scholars can substantiate their decisions about study designs and measurements. Such orientation material should include

- Reflections on best practice in experimental studies, the choice and construction of control conditions (e.g., "no message" versus "theoretically meaningful different message") as well as the implementation of manipulation checks (Gollwitzer, 2025; O'Keefe, 2003) in particular
- Reflections on the interpretation of statistical effect sizes that characterize the magnitude of (causal) media effects – given that consensual criteria have not yet been established (Weber & Popova, 2012)
- Reflections on measurement validity that pertain to independent variables (message dose consumed), mediators (e.g., immediate affective audience responses), and outcome variables (e.g., behavioral intentions) – especially given the well-known problems with self-report methods that much media effects research cannot circumvent
- Reflections on possible constraints of validity of causality tests as well as generalizability that stem from (missed, failed, or inadequate) sampling of stimulus messages – studies that operate with single messages supposed to represent entire class of theoretically relevant communication are at risk of compromised validity or generalizability, so effective strategies to build pools of sample stimuli are required
- Reflections on how to design empirical studies that are capable to detect systematic patterns of media effects in spite of fragmentation and "drifting" dynamics in digital, message-abundant communication platform ecosystems (Sagalnik, 2019).

4. Towards a Better Discipline: Programmatic Outlook, Active Work Groups, and an Open Invitation to Join „The Herrenhausen Project"

The discussions prepared for and held during the Scoping Workshop have disclosed a broad range of challenges and opportunities to improve the epistemological, theoretical, and methodological capabilities of media effects research. Some of them require far-reaching innovations in building and formalizing theories; others rather relate to promoting best practice and to improving procedures for enhanced validity or parsimony based on recommendations that have already been circulated. Many of them require continued

deliberation, either to identify innovation pathways or to build consensus on which existing practices offer potentials to achieve progress on addressing temporality issues or on hardening causality assumptions and testing. Along the theme lines portrayed above, members of the Scoping Workshop community have declared their willingness to engage in such continued elaboration. Initial products of these continuations will be circulated over the course of 2025, which will include a broader outreach to media effects scholars beyond the workshop-inspired task groups.

Specifically, several task groups have been formed during the workshop that are continuing discussions on selected themes. One group will continue the workshop's discussions on theorizing and testing causality assumptions. A second group is focused on the temporality-causality challenges in longitudinal media effects research, which includes conceptual aspects of clarifying time-related assumptions as well as methodological aspects of timing measurement intervals, data collection windows, and entire study setups. A third group has emerged that focuses on orientation knowledge about best practice in designing and implementing media effects studies, with a focus on temporality, causality, and related validity issues. This group has begun working on a draft 'checklist' that eventually will be published, with young scholars in media effects as primary target audience.

Beyond these working groups for direct continuation, the Scoping Workshop has inspired ideas of various follow-up initiatives that are yet to advance into organized collaborations:

- Multi-lab initiatives to address temporality-related questions of media effects; such cooperative efforts will be useful to generate robust evidence about the consequences of different time-related theoretical or methodological decisions by means of systematic comparisons
- Systematic analysis of "limitations" sections of existing media effects publications to learn about those challenges of time and causality that scholars in the field (typically) acknowledge – or do not mention; such findings will allow to characterize the 'demand side' of methodological innovation concerning time and causality
- An expert group for developing and suggesting standards for the documentation of media effects studies (e.g., libraries of stimulus messages; temporal sequencing of laboratory procedures) and for the interpretation of statistical effect sizes in media effects contexts; the latter is relevant because statistical categories of effect strength (e.g., Cohen's (1988) rule of thumb that differentiates "weak", "moderate", and "strong" effects) require recontextualization for media effects that are most often and unsurprisingly statistically small, but nonetheless theoretically potentially important, given the ubiquity of media content and the extent of usage that multiply a (small) effect over a large media audience and/or over an extended period of time,
- An expert panel to introduce formal modelling to communication theorizing as one way to achieve greater explicitness in reasoning about time and causality, potentially using existing verbal theories as point of departure.

Overall, the Scoping Workshop exercise has produced a broad range of challenges and opportunities for the field of media effects research. Addressing them further will shape the programmatics of entire communication science and offer rich perspectives for senior and young scholars alike, including new pathways for scientific excellence and rigor, productive

multi-site, multi-country collaboration, as well as greater utility of empirical contributions for academia and many communities of practice that rely on strong insights on media effects, such as civic society, political parties, public health organizations, and many more.

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