

Cascading Failures, Course Reversals, and Closures: An Analysis of the Federal Republic of Germany's Post-Disaster Nuclear Energy

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Research Focus

This project inquires into the process of nuclear energy policy changes due to nuclear disasters, specifically in the Federal Republic of Germany (BRD).

Research Question: How do nuclear disasters affect the subsequent nuclear energy policies of democratic states?

Motivation for This Work

Background and Impetus: College of Wooster senior thesis; comparative political science/German studies double major.

Impetus: Global warming and decarbonization; debates about nuclear power's role; the role of nuclear power in Germany after the Atomausstieg and Russo-Ukraine War.

Implicated Areas: Policy process; politics of disasters; nuclear energy policy and debates; advocacy coalitions.

Punctuated Equilibrium Theory (PET): Focuses on regular, small changes vs. infrequent, large ones to create a new policy equilibrium. Authors include Frank R. Baumgartner, Brian D. Jones, Peter B. Mortensen, and Ethan J. Fagan.

Advocacy Coalition Framework (ACF): Focuses on the role of groups of policy actors in policy change. Bounded rationality, policy subsystems, and policy windows are overlapping concepts. Authors include Daniel Nohrstedt, Paul Sabatier, Karin Ingold, Christopher M. Weible, Elizabeth A. Koebele, Kristin L. Olofsson, Keiichi Satoh, and Hank C. Jenkins-Smith.

Literature Review

Punctuated Equilibrium Theory

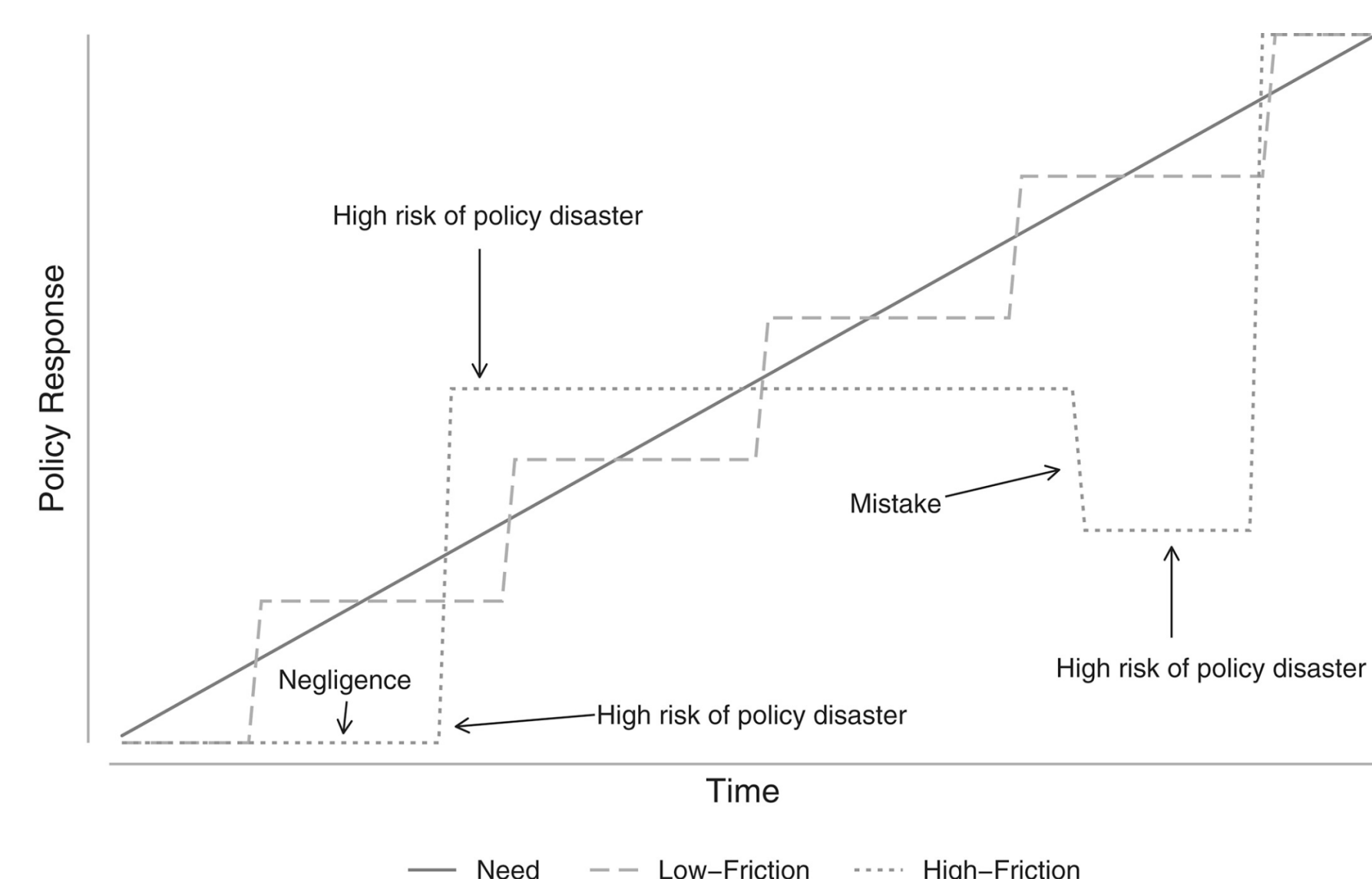
Focusing Events: Attention-spiking events that cause harm.

Policy Subsystems: Topic of discussion; Politics of equilibrium.

Positive/Negative Feedback: Prevention or causing of change.

Policy Images: Empirical information and emotive appeals that interpret the problem and the policy solution under discussion.

Bounded Rationality: Cause of decisions from limited information.



Literature Review

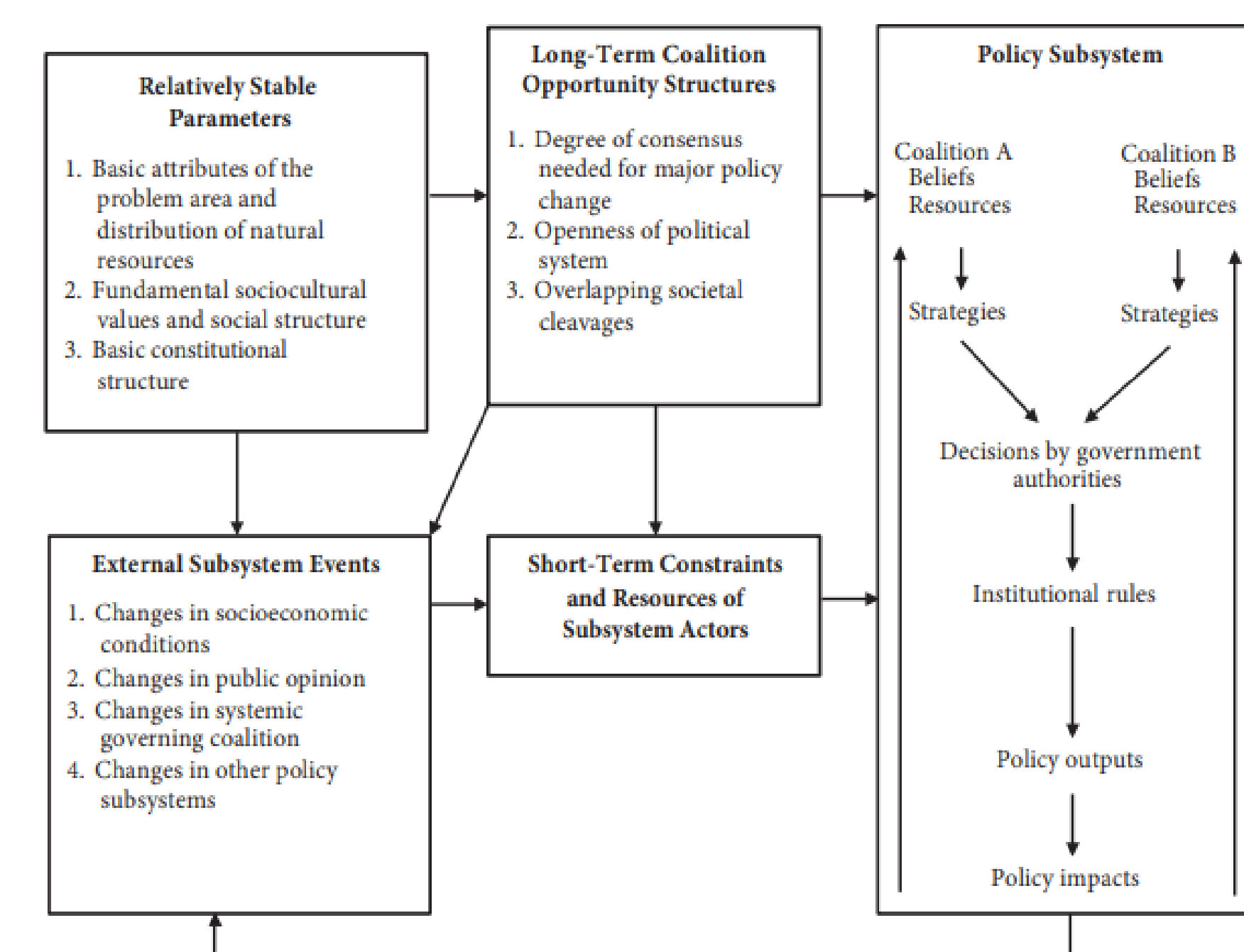
Advocacy Coalition Framework

Coalition Hypothesis 2: Policy core as basis of advocacy coalitions.

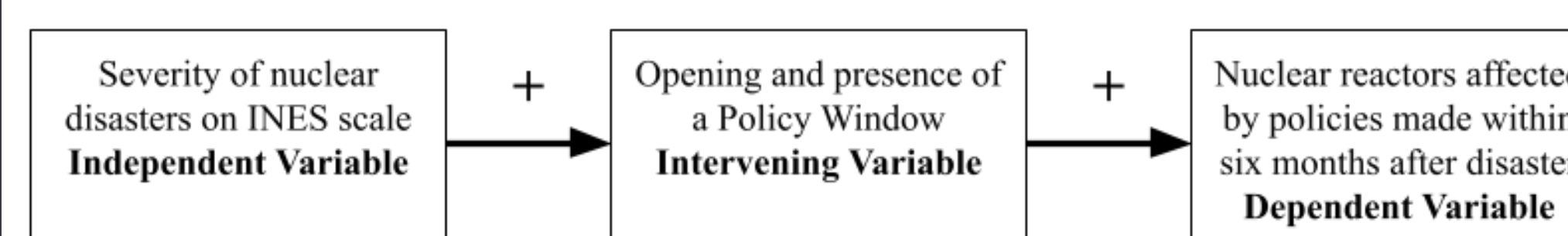
Coalition Hypothesis 3: Order of beliefs given up.

Learning Hypothesis 5: Policy brokers and opinion changes.

Policy Change Hypothesis 1: Four pathways to policy.



Hypothesis and arrow diagram



Independent Variable (IV): International Nuclear and Radiological Event Scale (INES) is ordinal, placing incidents on a scale of 0 (least bad) to 7 (worst).

Intervening Variable: Policy window is when both 1. One of the conditions from Policy Change Hypothesis 1 is present, and 2. The "attention ratio. Nominal variable ("0" for no, "1" for yes).

Dependent Variable (DV): Ratio variable based on the percentage of operable nuclear reactors affected by laws passed within six months after a disaster.

Data & Methodology

News Coverage: Textual analysis; Eight groups (see below). Time frame: six months before and six months after disaster.

Policy Process: Longitudinal case studies; Process tracing; Probability probe.

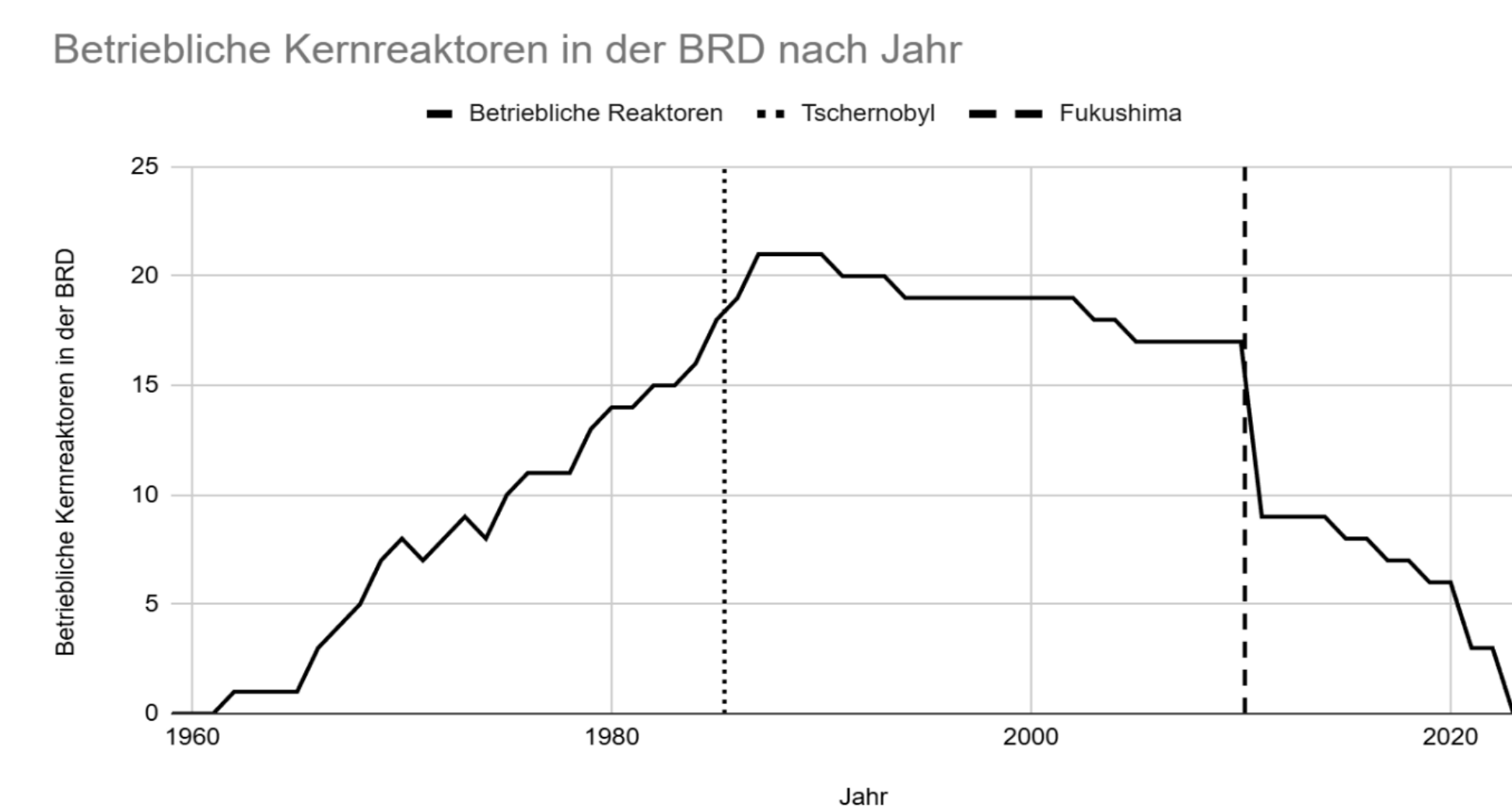
Timeframe	FAZ Articles	ND Articles	Total
Chernobyl			
Before	10	6*	16
After	10	10	20
Fukushima			
Before	10	10	20
After	10	10	20

Result (Policy Process)

Part	Before Chernobyl	After Tschornobyl	Ratio (After/Before)
Newspapers	69 (FAZ); 6 (ND)	588 (FAZ); 62 (ND)	9.427
Bundestag Sessions	18/45	24/27	2.222
Election Platforms	11	61	5.545
Attention Ratio			5.731

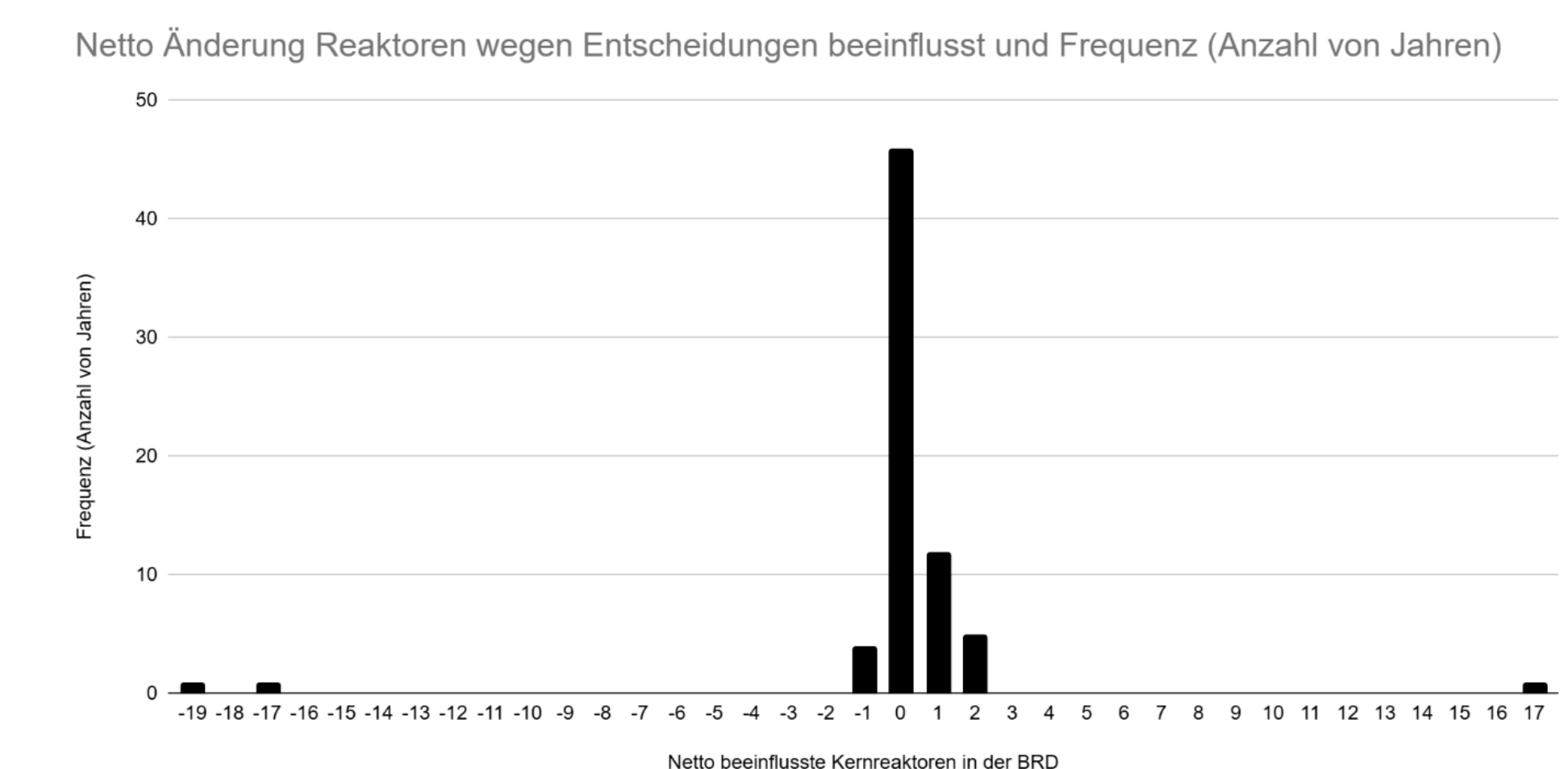
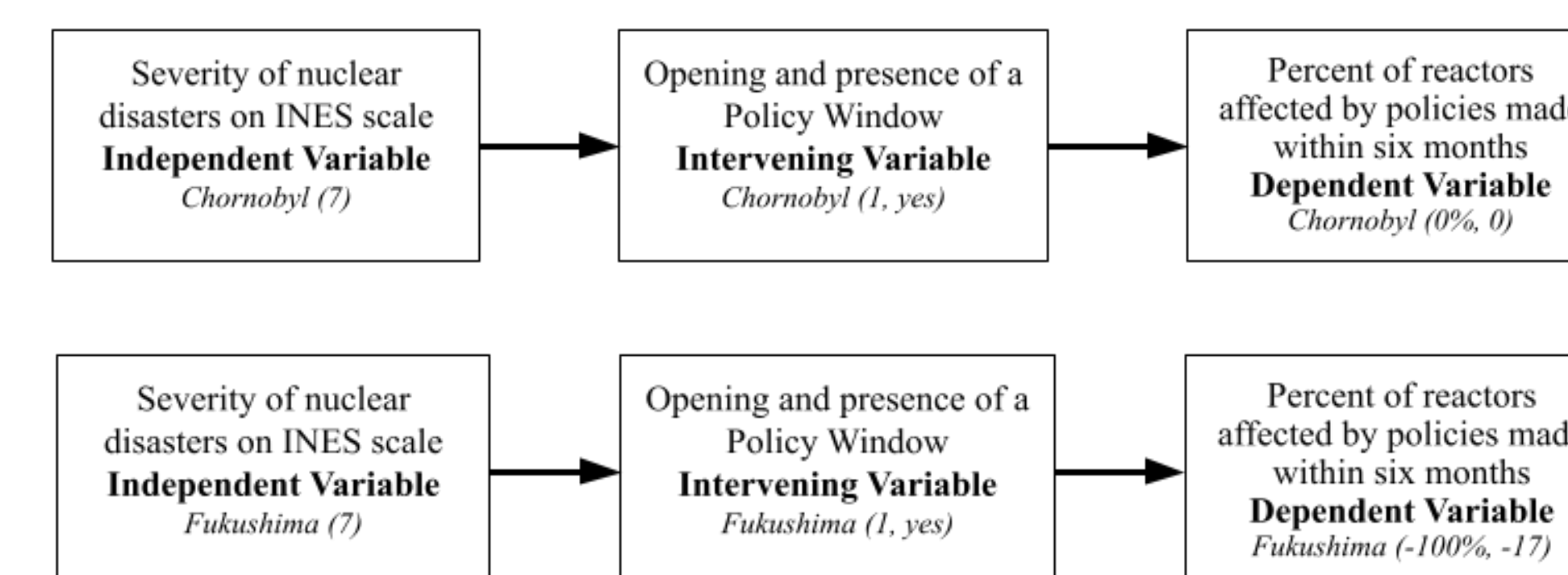
Part	Before Fukushima	After Fukushima	Ratio (After/Before)
Newspapers	56 (FAZ); 77 (ND)	494 (FAZ); 317 (ND)	6,469
Bundestag Sessions	26/38	19/23	1,207
Election Platforms	83	87	1,048
Attention Ratio			2,908

Above: Attention Ratio Calculations for the Chernobyl (top) and Fukushima (bottom).



Above: The number of operational reactors in the BRD by year.

Below: Hypothesis for the two disasters. Fukushima is the one on the bottom.



Above: Number of years in which different numbers of BRD reactors were affected. Affected reactors include those that had their end dates affected by a law, otherwise started operation, or were shut down.

PET: Direct policy change is not guaranteed after a disaster or after a subject rises to near the top of the agenda (see the graph of operational reactors). Leptokurtic distribution of changes is also possible outside budgets (see above). Bounded rationality and policy images also played important roles.

ACF: All four hypotheses were further confirmed. Shifts in coalitions after disasters.

Results (News Coverage)

Newspaper/Timeframe	Positive Articles	Neutral Articles	Negative Articles
FAZ			
Pre-Chernobyl	1	8	1
Post-Chernobyl	3	5	2
ND			
Pre-Chernobyl	4	2	0
Post-Chernobyl	2	6	2
Pre-Disaster			
Pre-Disaster	5	10	1
Post-Disaster	5	11	4
Total	10	21	5

Newspaper/Timeframe	Positive Articles	Neutral Articles	Negative Articles
FAZ			
Pre-Fukushima	3	5	2
Post-Fukushima	1	6	3
ND			
Pre-Fukushima	0	2	8
Post-Fukushima	0	2	8
Pre-Disaster			
Pre-Disaster	3	7	10
Post-Disaster	1	8	11
Total	4	16	21

Top: News coverage results for Chernobyl.

Bottom: News coverage results for Fukushima.

Note: Small sample sizes and categorization done alone make these results not generalizable.

IMPLICATIONS

Connections: Policy-oriented learning and policy images; Policy-oriented learning and feedback; Policy images and advocacy coalitions; And policy windows, advocacy coalitions, and feedback.

Suggestions for Future Research: How likely are disasters to cause policy change? What is the more general trend of nuclear disasters and changes to nuclear energy policy? Do most non-budget areas have leptokurtic distributions of change? What impacts does federalism have on nuclear policy? Are disasters the "ultimate focusing event"?

ACKNOWLEDGEMENTS

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