



Instructor's Guide to Escalation and Shared Risk

Laboratory implementation, theoretical foundations,
experimental evidence, and variants

Behavioral and Experimental Economics Research Lab
Department of Economics



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<https://beer-lab.org/>

How to use this guide

This guide supports the preparation, operation, and discussion of the Behavioral and Experimental Economics Research Lab activity on escalation and shared risk. The activity is designed for courses in international relations, political science, economics, negotiation, and strategic decision making. It represents a dynamic crisis without assigning participants to actual countries, ideologies, or historical disputes. That abstraction lets an instructor focus on a precise question: why may two actors continue a confrontation when joint continuation exposes both of them to a danger that neither can fully control?

The guide combines an operational manual with a conceptual teaching note. A first-time instructor can use the quick-start chapter to select a session, distribute links, and read the private report. The mechanism chapters reconstruct every possible outcome and show how conditional risk accumulates. The theory chapters provide benchmarks based on expected values, backward reasoning, strategic uncertainty, bargaining, and risk manipulation. Later chapters explain the six institutional extensions, the aggregate report, class plans, quantitative exercises, data structure, limitations, and troubleshooting.

Three reading paths are possible. For a short demonstration, read Chapters 1, 2, and 7 before class and use the fifteen-minute feedback script in Chapter 8. For a full laboratory session, add Chapters 5 and 6 so that every screen and treatment is familiar. For an advanced course, assign the probability calculations and discussion problems in Chapters 3, 4, and 11. The basic rules appear only once; each extension states exactly what it changes and what comparison that change can support.

The numerical predictions in this guide are analytical reference points. They are not psychological diagnoses. A choice to continue can be consistent with a high expectation that the other actor will yield, a desire to avoid an unequal settlement, optimism about the random draw, a preference for risk, a concern about appearing weak, confusion, or a deliberate mixed strategy. The activity does not identify any one of those motives by itself. Good feedback therefore separates an observed action from the unobserved belief that may have supported it.

Author

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For the instructor

This guide follows the English interface. The Spanish sessions implement the same timing, randomization, and payoffs. Project only the aggregate instructor report. Do not display individual participation links, identify a choice with a name or seat, or ask students to disclose which button they selected.

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Quick implementation guide

1.1 Activity profile

Purpose	Examine how continuation in a crisis exposes both actors to shared risk and how different exit institutions affect escalation.
Experimental unit	A pair consisting of Actor A and Actor B. The number of participants must be even; partner reassignment requires at least four participants.
Basic edition	One crisis; ten crises with a fixed partner; or ten crises with partner reassignment between crises. Every crisis can contain up to five internal steps.
Extended edition	Constant risk, structured communication, asymmetric consequences, a rising cost of backing down, negotiated exit, and emergency mediation.
Decision	At every active step, both actors simultaneously choose Back down or Continue. Some extensions add a message, proposal, or mediation response before that decision.
Payoff	Unilateral backing down gives 20 to the actor who backs down and 80 to the actor who continues. Mutual backing down gives 50 each. Joint continuation activates a random draw; an accident gives 0 each in the reference treatment. Surviving step five gives 50 each.
Suggested duration	35–45 minutes for one crisis and discussion; 60–80 minutes for ten crises and a dynamic comparison.
Participants	An even number; at least four for partner reassignment.
Topics	escalation; shared risk; crisis bargaining; communication; mediation; international conflict.
JEL	A22, C72, C92, D81, D74, F51.

1.2 Access and ten-minute preparation

Begin at <https://beer-lab.org/> and follow the link to the teaching catalog at <https://teaching.beer-lab.org/>. The public activity is called “Escalation and Shared Risk.” Its proposed family domain is <https://escalation.beer-lab.org/>. Before announcing that address to a class, confirm with the laboratory that the public deployment is active. The

intended routes are <https://escalation.beer-lab.org/demo> for instructor demonstrations and <https://escalation.beer-lab.org/rooms> for room access.

The basic English room is https://escalation.beer-lab.org/room/escalation_en; the basic Spanish room ends in [/room/escalada_es](https://escalation.beer-lab.org/room/escalada_es). The extended English and Spanish rooms end in [/room/escalation_extended](https://escalation.beer-lab.org/room/escalation_extended) and [/room/escalada_extendido](https://escalation.beer-lab.org/room/escalada_extendido). These are proposed product routes until deployment is confirmed. On the validated local instance, the instructor opens <http://localhost:8195/demo>. That local address works only on the computer running the service.

Choose the learning objective before choosing the configuration. A single crisis is appropriate for introducing the mechanism and accumulated risk. Ten crises with a fixed partner allow bilateral learning, adaptation, and possible informal reputation. Ten crises with partner reassignment help distinguish general learning from adjustment to one particular counterpart. If an extension is used, choose one institution that answers the class question. A clean comparison between two conditions is usually more informative than a collection of many variants with only a few pairs in each.

Every student receives a unique participation link. Keep the instructor link and report page private. Do not reuse links from an old session. Confirm the number of participants shown in the room before starting. Partner reassignment needs at least two pairs because the matching rule avoids an immediate rematch whenever the group size permits. Roles remain stable across the session: a participant assigned Actor A continues as A even when the counterpart changes. This stability prevents a partner change from being confounded with a change in strategic position.

Demo

[ES] Escalada y riesgo compartido — Una crisis
[ES] Escalada y riesgo compartido — Diez crisis con pareja fija
[ES] Escalada y riesgo compartido — Diez crisis con nueva pareja
[EN] Escalation and Shared Risk — One crisis
[EN] Escalation and Shared Risk — Ten crises with a fixed partner
[EN] Escalation and Shared Risk — Ten crises with partner reassignment
[ES] Escalada y riesgo compartido — Riesgo constante
[ES] Escalada y riesgo compartido — Comunicación estructurada
[ES] Escalada y riesgo compartido — Consecuencias asimétricas
[ES] Escalada y riesgo compartido — Costo creciente de ceder
[ES] Escalada y riesgo compartido — Salida negociada
[ES] Escalada y riesgo compartido — Mediación de emergencia
[EN] Escalation and Shared Risk — Constant risk
[EN] Escalation and Shared Risk — Structured communication
[EN] Escalation and Shared Risk — Asymmetric consequences
[EN] Escalation and Shared Risk — Rising cost of backing down
[EN] Escalation and Shared Risk — Negotiated exit
[EN] Escalation and Shared Risk — Emergency mediation

Escalada y riesgo compartido / Escalation and Shared Risk — BEER Lab

Seleccione una variante de este juego. Select a version of this game.

Rooms

Current rooms:

[ES] Escalada y riesgo compartido
[EN] Escalation and Shared Risk
[ES] Escalada y riesgo compartido — Extendido
[EN] Escalation and Shared Risk — Extended

- (a) An isolated catalog with eighteen configurations. (b) Four rooms separated by language and edition.

Figure 1.1: Instructor access to the escalation and shared-risk family.

Checkpoint

Before distributing links, verify an even number of participants, the correct language, the correct edition, the intended one-crisis or ten-crisis matching rule, and an isolated panel containing only this game family. Keep the private aggregate-report address open in a separate instructor tab.

1.3 A compact classroom sequence

A fifty-minute class can allocate five minutes to access, eight minutes to instructions and comprehension, ten minutes to decisions, twelve minutes to the aggregate report, and fifteen minutes to

discussion. Ten-crisis sessions need more time or a shorter debrief. Do not convert ECU into cash unless a conversion rule has been approved and communicated before decisions begin. The point system provides incentives and a common language for reconstructing consequences.

Before starting, draw a line with five steps and write 5, 10, 15, 20, and 25 percent above it. Ask students for the probability of surviving the entire sequence if both actors always continue, but postpone the solution. After play, compute 43.605 percent and use it to show why conditional hazards cannot be added. Repeated moderate risks can create substantial cumulative exposure.

For the instructor

The main debriefing choice is when to reveal the report. Keep aggregate outcomes hidden until the final pair finishes. Before selecting “Reveal aggregate results,” ask for predictions about the accident rate, the average exit step, mutual backing down, and the difference in average payoffs between the two roles.

The mechanism and its accounting

2.1 An abstract dynamic crisis

The activity assigns two actors to a contested position without naming countries or attaching moral labels. In each active step, A and B choose simultaneously between Back down and Continue. Backing down prevents the accident draw in that step. Continuing may secure 80 ECU if the counterpart backs down, but joint continuation activates a danger shared by the pair. The mechanism does not ask anyone to press a button labeled “war.” Instead, deliberate choices to maintain pressure can leave both actors inside an environment in which an accidental loss is possible.

There are four basic action profiles. If A backs down and B continues, A receives 20 and B receives 80. If B backs down and A continues, the payments are reversed. If both back down, each receives 50. If both continue, the platform stores one uniform random number between zero and one and compares it with that step’s risk. A number below the threshold produces an accident and ends the crisis. A number at or above the threshold allows the crisis to advance. If the pair survives the fifth-step draw, the horizon ends with 50 for each actor.

The order of operations matters. Any unilateral or mutual backing down ends the encounter before the random draw. The program therefore cannot record a fresh accident after an actor has backed down in the same step. Each joint continuation generates exactly one draw, and the stored draw is reused if a browser reloads. At the fifth step, the crisis necessarily ends either through an accident, a decision-based exit, or survival with the equal outcome. No participant remains trapped beyond the horizon.

2.2 Step risk and cumulative survival

Let p_t denote the probability of an accident at step t , conditional on the crisis reaching that step and on both actors choosing Continue. In the reference environment,

$$(p_1, p_2, p_3, p_4, p_5) = (0.05, 0.10, 0.15, 0.20, 0.25).$$

The probability of surviving all five draws is not one minus the sum of these five risks. Each probability is conditional on having survived the earlier draws. Survival requires five events, so the complements multiply:

$$S_5 = (1 - .05)(1 - .10)(1 - .15)(1 - .20)(1 - .25) = 0.43605.$$

The probability of at least one accident during five joint continuations is $1 - S_5 = 0.56395$. This number describes the hypothetical path in which both actors always continue. It is not the accident frequency the class must observe because many pairs will leave before five exposures.

BASIC EDITION · RISING RISK

How the crisis works

You are paired with another participant and keep role A or B throughout the session. Each crisis can last up to five steps.

At every active step, both actors simultaneously choose whether to back down or continue. If one backs down and the other continues, the actor who backs down receives 20 ECU and the actor who continues receives 80 ECU. If both back down, each receives 50 ECU.

If both continue, the platform stores one draw. Under rising risk, the accident probability is 5%, 10%, 15%, 20%, and 25% in steps one through five. An accident ends the crisis. If both survive joint continuation at step five, each receives 50 ECU.

When a concession ends the crisis, no accident draw occurs. The screen displays the current risk and the probability of passing all remaining steps without an accident if both always continued.

Rule for this session

Accident risk rises by step: 5%, 10%, 15%, 20%, and 25%.

Continue

Figure 2.1: Common rules and the session-specific rule.

The interface also gives the probability of surviving from the current step through the horizon. On reaching step two, conditional survival over the four remaining draws is

$$0.90 \times 0.85 \times 0.80 \times 0.75 = 0.459.$$

That 45.9 percent is higher than 43.605 percent because the pair has already survived the first draw. It does not imply that the later environment has become safer. The conditioning event has changed.

The probability that the first accident occurs at step t is the probability of surviving every earlier exposure multiplied by p_t . For example, a first accident at step four has probability

$$(0.95)(0.90)(0.85)(0.20) = 0.14535$$

under universal joint continuation. These first-accident probabilities, plus the probability of surviving all five draws, sum to one. Showing that identity on the board provides a useful check on the calculation.

Theoretical foundation

A threat that leaves something to chance differs from a deliberate choice of the catastrophic outcome. In theories of international conflict, escalation can create bargaining pressure because neither actor fully controls where the sequence ends. The game makes that distinction observable: participants deliberately choose whether to continue, and a separate exogenous draw determines whether joint continuation survives.

2.3 Three fully worked paths

Consider a pair that continues in steps one and two. The stored number in step one is 0.62, above 0.05, so no accident occurs. The stored number in step two is 0.07, below 0.10, so an accident

occurs. The crisis ends at step two and both actors receive 0 ECU in the reference treatment. Before any decision, the probability of that precise random path is $(1 - 0.05) \times 0.10 = 0.095$, or 9.5 percent. The first survival is part of the path and must be included.

Now consider a second pair that jointly continues twice. At step three, A continues and B backs down. The platform does not run the 15-percent draw because an action-based exit has already occurred. A receives 80 and B receives 20. The random draws in steps one and two remain in the data because they describe earlier exposure, but they are not charged again. The terminal outcome is determined by the step-three actions.

Finally, suppose both actors back down at step one. They each receive 50 and no random number is needed. Total payments equal 100 in every peaceful reference exit: $20 + 80$ after unilateral backing down or $50 + 50$ after mutual backing down or horizon survival. An accident destroys that surplus. The design therefore separates distribution from efficiency. An actor may continue in pursuit of 80 even though joint continuation places a total of 100 at risk.

Checkpoint

Reconstruct an observation in this order: the step reached, A's action, B's action, whether a draw was permitted, the stored draw when applicable, the terminal category, and the two payments. A newly generated draw appearing beside a decision-based exit in the same step would indicate an implementation problem.

2.4 Timing within a step

The timing is common knowledge. In the reference treatment, participants first view the crisis and current step. They then make their action choices privately and simultaneously. The system waits until both choices exist. If at least one person backed down, the crisis ends immediately and payments are assigned. If both continued, the stored random draw is compared with the step risk. An accident ends the crisis; survival leads either to the next step or, after step five, to the equal terminal payment.

Some extensions insert an institutional stage before the action choices. A structured message is sent before the decision, an offer is proposed and answered before the decision, and a mediator proposal is considered before the decision. An accepted agreement ends the crisis without reaching the action screen. A rejected or incomplete agreement returns the pair to the same step's Back down/Continue decision. The risk schedule is activated only after two continuations, exactly as in the reference.

This separation is essential for interpretation. A pair that settles through an accepted offer did not jointly back down. A pair that accepts mediation did not reach the risky action profile. A message followed by mutual continuation records communication and exposure as two distinct events. The aggregate report keeps these terminal categories apart so that an instructor can ask whether an institution changed the available path rather than merely relabeling the same result.

Strategic benchmarks

3.1 A final-step expected-value comparison

At any step, the appeal of continuing depends on what an actor believes the counterpart will do. Begin with the fifth step, where no future decision remains. Let q be A's belief that B will back down and let p be the accident risk following joint continuation. If A continues, A obtains 80 with probability q . When B also continues, A obtains zero after an accident and 50 after survival. The expected value is

$$V_C = 80q + 50(1 - q)(1 - p).$$

If A backs down, A receives 50 when B also backs down and 20 when B continues:

$$V_B = 50q + 20(1 - q) = 20 + 30q.$$

These expressions do not yield one universal instruction because both q and p matter. The other actor's behavior is a strategic choice, not a natural event with a known frequency. The calculation is useful for identifying the belief that would support an action, but the application does not elicit that belief.

At the fifth step of the reference environment, $p = .25$. Subtracting the two values gives

$$V_C - V_B = 17.5 + 12.5q,$$

which is positive for every q between zero and one under risk neutrality and these terminal payoffs. This benchmark helps explain why reaching the horizon may produce another joint continuation. It does not make the earlier steps trivial: continuation before step five leads to another strategic decision rather than directly to 50, and beliefs about future behavior and future risk enter the calculation.

3.2 Earlier steps and continuation values

At a step before the horizon, surviving joint continuation produces a continuation value rather than an immediate payment. Let W_{t+1} denote an actor's expected value on entering the next step. The current value of Continue becomes

$$V_C(t) = 80q_t + (1 - q_t)(1 - p_t)W_{t+1},$$

when an accident pays zero. Backing down still gives $20 + 30q_t$. A full solution requires a strategy and belief system for both actors at every information set. Backward reasoning begins at step five and substitutes equilibrium continuation values into step four, then step three, and so on.

The classroom need not assert a unique equilibrium when the environment permits multiple strategic expectations. Instead, instructors can calculate scenarios. What if each actor assigns a 60-percent chance that the other will back down? What if a student expects mutual continuation now but mutual backing down next step? Which belief threshold reverses the choice? This approach preserves the strategic nature of the problem and avoids presenting one observed behavior as mechanically required.

The rising risk schedule creates two opposing effects. A later step is more dangerous conditional on joint continuation, which increases the cost of unresolved conflict. At the same time, a pair that reaches a later step has survived earlier draws and may have learned that both actors are willing to continue. The population of crises at later steps is therefore selected. A high continuation rate at step four cannot be compared directly with the rate at step one without recognizing which pairs remain.

3.3 Strategic uncertainty and shared exposure

There are two distinct forms of uncertainty. Random risk concerns the stored accident draw conditional on two Continue choices. Strategic uncertainty concerns the counterpart's private action. Participants know the programmed risk but do not know the other action when choosing. The former can be written as a probability supplied by the rules; the latter depends on beliefs, communication, repetition, and institutional context.

This distinction is a central learning objective. A participant can correctly compute the accident probability and still make a poor forecast of the counterpart. Conversely, a participant may accurately anticipate backing down and therefore never face the draw. The observed accident rate combines action selection with mechanical risk. It should not be used as if it were a direct estimate of the programmed probability without conditioning on joint continuations at each step.

Shared risk also creates a gap between private incentives and joint welfare. Continuing can be attractive when an actor expects the counterpart to concede, while two such expectations produce joint exposure. The inefficiency is not caused by a failure to know that the accident is costly. It can arise from incompatible expectations about who should bear the distributive cost of backing down.

Theoretical foundation

The game separates three objects that students often combine: the distributional contest over 20 versus 80, the joint surplus of 100 in peaceful outcomes, and the random destruction of that surplus after joint continuation. Escalation is possible because a choice aimed at the first object changes exposure to the third.

3.4 Risk attitudes, mixed behavior, and inference

Expected-value calculations assume risk neutrality unless otherwise stated. A risk-averse actor may value the sure 20 from unilateral backing down differently from a lottery with a higher mean. A risk-seeking actor may respond in the opposite direction. The game does not independently measure utility curvature, so the instructor should present expected values as monetary benchmarks. If risk preferences are a central research question, they require an additional measurement task and a pre-specified analysis plan.

Observed frequencies may also reflect mixed strategies. A person can randomize deliberately, vary actions across crises, or appear to randomize because beliefs change. Repetition with the same

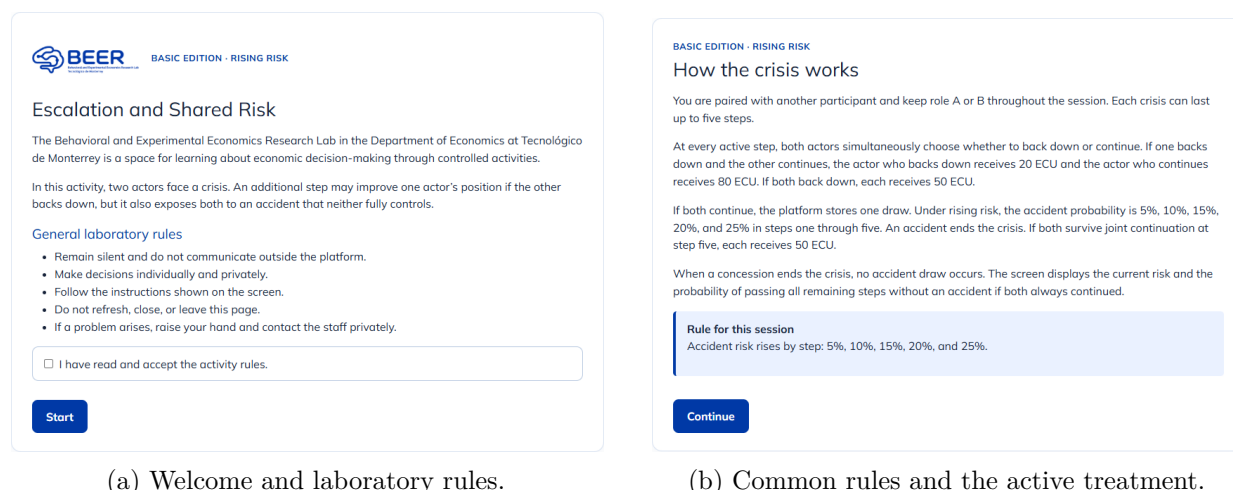
partner adds learning and possible history dependence. Reassignment changes the informational environment but does not erase what a person learned about the population. None of these patterns should be reduced to stable character labels.

Use the report to state what is directly observed: an action profile, a terminal step, an exposure, an accident, an agreement, and a payment. Then identify the extra assumptions needed for a strategic interpretation. A careful sentence is “joint continuation was more common under structured messages in this class.” A stronger causal or psychological statement requires random assignment, adequate sample size, and measurements that the activity alone does not provide.

Participant experience

4.1 Welcome, rules, and comprehension

The welcome page identifies the activity, language, edition, and matching structure. Participants confirm that they will make their own decisions, avoid communication outside the interface, protect their unique link, and wait quietly when the counterpart has not finished. This acceptance is an operational rule for the teaching session. It does not replace any institutional consent procedure required for research.



(a) Welcome and laboratory rules.

(b) Common rules and the active treatment.

Figure 4.1: The opening sequence in English.

The instruction page explains the five-step horizon, the four basic action profiles, and the accident schedule. A treatment-specific panel describes the one rule that differs from the reference. The interface repeats essential numbers so that memory is not the object being tested. Participants may review the rule before moving to comprehension.

Comprehension questions cover action priority, payoffs, random risk, and the current extension. Incorrect responses return an explanation rather than silently advancing. The goal is not to rank students. It is to protect the interpretation of later decisions by ensuring that obvious rule misunderstandings are corrected before the crisis begins.

What participants will see

Participants see descriptive role names, the current crisis and step, the risk for that step, the available actions, and the consequences of each action profile. They do not see another person's choice while deciding, any production label, the aggregate report, or identifying

Comprehension check

What is the percentage accident risk at the first step if both continue?

If one actor backs down and the other continues, does the crisis end without an accident draw?

If both continue at step five and no accident occurs, how many ECU does each receive?

Continue

Figure 4.2: Comprehension checks before role assignment.

information about their counterpart.

4.2 Stable roles and crisis start

After comprehension, each participant receives Actor A or Actor B. The role remains stable across all crises in that session. In a fixed-partner session, the pair also remains stable. In a reassignment session, the counterpart can change between crises while the role remains the same. The crisis-start page states whether the partner is fixed or reassigned without revealing personal identity.

CRISIS 1 OF 1

A new crisis begins

Actor A
 One crisis

5
 Step

Your role remains fixed throughout the session. Your choices and the other actor's choices jointly determine when and how the crisis ends.

Accident risk rises by step: 5%, 10%, 15%, 20%, and 25%.

Continue

Figure 4.3: Crisis start with stable role and matching information.

Stable roles simplify comparison. If an actor's average payment changes after reassignment, that change cannot be attributed mechanically to switching from A to B. At the same time, role-specific averages should still be reported because some extensions assign consequences or proposal rights differently. The asymmetric-loss treatment, for example, intentionally gives different accident payoffs to A and B.

4.3 Decision, waiting, and survival

The decision card displays the current step, the conditional accident risk, and the cumulative probability of surviving the remaining draws if both actors continue throughout. Two large response

options summarize the implications of Back down and Continue. The participant must actively select one option before advancing. The counterpart's current choice is never revealed on this page.

(a) The simultaneous decision at step one.

(b) The decision after one survived exposure.

Figure 4.4: Decision cards update the step risk and remaining survival probability.

After submitting, a participant may reach a waiting page while the counterpart decides. The waiting page does not disclose which action has been submitted. It can refresh automatically or be revisited without creating an additional random draw. Instructors should explain that waiting is normal and should not be interpreted as a signal about the other choice.

When both actors continued and the draw was safe, a survival page reports the stored draw, the threshold, and the fact that the crisis advances. It does not reveal future actions. The next decision is a new simultaneous move with a new risk. At the horizon, survival leads directly to the equal terminal outcome.

(a) Private waiting after submitting a choice.

(b) Feedback after a survived joint continuation.

Figure 4.5: Waiting and survival are distinct states.

4.4 Crisis result and session summary

The crisis-result page names the terminal mechanism, terminal step, actions at that step when applicable, and role-specific payments. It also reconstructs earlier joint continuations and draws. In a repeated session, the page advances to the next crisis after both members of the pair are ready. In a one-crisis session, it advances to the final summary.

The final summary reports only the participant's own crisis outcomes and total payment. It contains no further submit button, so repeated clicking cannot create another observation. The page is designed for desktop projection and narrow mobile screens without horizontal overflow. Participants may close the page after the instructor confirms that the aggregate report has received every completed pair-crisis.

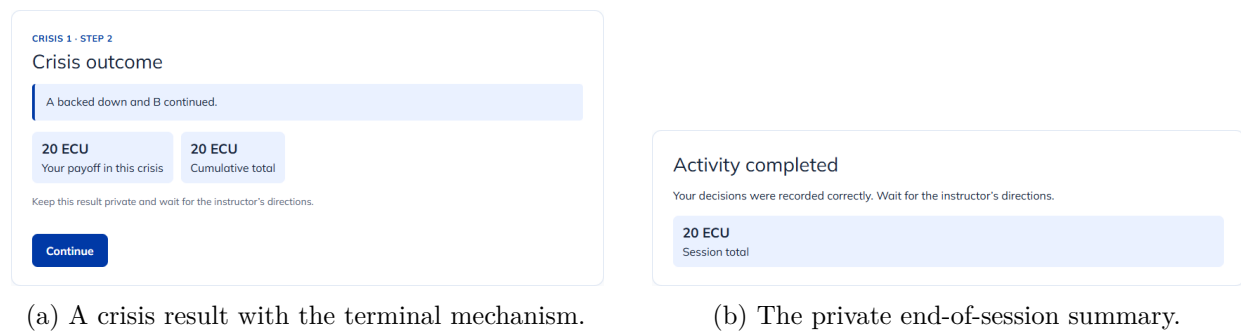


Figure 4.6: Participant feedback after the crisis and after the session.

Attention

Do not ask participants to hold up a hand for Back down or Continue, compare final screens with a neighbor, or announce a private total. Those practices change the strategic information available during repeated play and undermine the privacy promised by the interface.

Basic sessions and matching

5.1 One crisis

The one-crisis session is the cleanest introduction. It has one role assignment, at most five simultaneous choices, one terminal outcome, and one private summary. It is suitable for a lecture demonstration, a short workshop, or a first exposure before discussing the strategic model. Because each pair contributes only one crisis, class-level percentages will be noisy unless the class is large.

Use one crisis when the learning goal is mechanical: distinguishing conditional from cumulative risk, reconstructing the order of actions and draws, or separating distribution from total surplus. Ask for predictions before the report appears. If the class contains only one or two pairs, focus on possible paths rather than treating the realized path as typical.

5.2 Ten crises with a fixed partner

The fixed-partner session repeats the same environment ten times with the same counterpart and stable roles. It allows learning about a particular partner, tacit coordination, retaliation, accommodation, and history-dependent behavior. Nothing in the rules makes earlier choices binding. Any reputation is generated endogenously through repeated experience.

The repeated structure changes interpretation. A shift toward early exits could indicate learning to coordinate, growing caution after an accident, or convergence on an unequal convention. A shift toward continuation could indicate greater confidence that the counterpart will back down. The aggregate report shows outcomes by crisis, but it does not identify the belief or motive. In discussion, compare several plausible mechanisms with the same observed trend.

Avoid intervening between every crisis unless the intervention is part of the teaching design. Public discussion becomes new common information and can coordinate later choices. If the instructor pauses after crisis five, record that break and treat crises six through ten as occurring under a changed information environment.

5.3 Ten crises with partner reassignment

The reassignment session rematches actors between crises while keeping their roles. When there are at least four participants, the matching logic avoids the immediately previous counterpart whenever possible. This rule reduces direct repetition but does not promise that a pair never meets again over ten crises. With only two participants, reassignment has no meaning, which is why the room requires at least two pairs.

Reassignment is useful for separating partner-specific adjustment from general learning. It can also spread conventions: participants learn from outcomes with one counterpart and carry that experience into the next match. Because choices remain private, any diffusion occurs through personal experience rather than observation of named actors.

The unit of analysis remains the pair-crisis. A person appears in multiple observations, and matching creates dependence across the class. Formal statistical analysis must respect that structure. For classroom description, display counts and rates with transparent denominators and avoid claiming that ten repeated crises are equivalent to ten independent pairs.

For the instructor

To compare fixed partners and reassignment, keep language, risk schedule, horizon, payments, and class instructions constant. Assign sessions before play, choose outcome measures in advance, and report the number of pairs as well as the number of pair-crises.

Extended institutions

6.1 Extension 1: constant risk

The constant-risk extension replaces the increasing sequence with a 15-percent accident probability at every step. All actions, payoffs, and the five-step horizon remain unchanged. The probability of surviving five joint continuations is

$$(1 - .15)^5 = 0.4437053125,$$

so the probability of at least one accident is approximately 55.629 percent. That cumulative exposure is close to the reference value of 56.395 percent even though the timing differs.

This comparison isolates the shape of the hazard. Under increasing risk, early continuation is relatively safe and later continuation is relatively dangerous. Under constant risk, every exposure has the same conditional hazard. Similar cumulative danger does not imply identical incentives at each step. The treatment is therefore useful for asking whether people respond to the current hazard, the remaining cumulative hazard, or the visual pattern of increasing pressure.

Do not compare accident counts without first comparing joint continuations by step. Different behavior changes the set of draws that occurs. The programmed probability is conditional on a draw; the observed number of accidents is jointly produced by choices and randomization.

6.2 Extension 2: structured communication

Before the action decision, each actor privately sends one standardized message: an intention to continue or an intention to seek settlement. Both messages are submitted before either is revealed. The messages are nonbinding and costless. After seeing both messages, participants choose Back down or Continue simultaneously under the reference risk and payment rules.

The standardized format prevents names, threats, side payments, and free-text coordination. It also makes messages directly countable in the report. Agreement between messages may create a focal point, while conflicting messages may reveal incompatible intentions. A message can also be strategic: stating an intention to continue does not commit the sender to the Continue action.

The treatment supports several questions. Do settlement messages increase mutual backing down? Does a Continue message induce the counterpart to back down or provoke joint continuation? Are inconsistent message-action pairs common? The interface observes the message and action but not sincerity, so the instructor should describe consistency rather than infer deception.

ACTOR B - PASO 1

Mensaje antes de decidir

Elige el mensaje que verá el otro actor antes de que ambos decidan.

☐ Pienso continuar

☐ Estoy dispuesto a ceder

☐ Prefiero un acuerdo equilibrado

Continuar

ACTOR B - PASO 1

Decisión simultánea

5%
Riesgo de accidente ahora

43.6%
Supervivencia hasta el final si ambos continúan siempre

Mensajes recibidos
Tu mensaje: Pienso continuar
Mensaje del otro actor: Prefiero un acuerdo equilibrado

Elige en privado. La plataforma revelará ambas acciones después de que los dos hayan respondido.

☐ **Ceder**
La crisis termina sin sorteo. Tu pago depende de la acción del otro actor y, si aplica, del costo acumulado.

☐ **Continuar**
Si el otro actor también continúa, se activa el riesgo de accidente de este paso.

Continuar

(a) Simultaneous structured messages.

(b) The action decision after both messages.

Figure 6.1: Communication precedes but does not replace the risky decision.

6.3 Extension 3: asymmetric accident consequences

The asymmetric-loss extension keeps the reference risk schedule but changes the accident payoff. Actor A receives 0 after an accident, while Actor B receives 20. Every peaceful exit retains the same distribution as in the basic treatment. The treatment therefore changes the downside of joint continuation without changing the prize from inducing the counterpart to back down.

At the fifth step, if B expects A to continue, B's conditional value from continuing is

$$20p + 50(1 - p),$$

which equals 42.5 when $p = .25$. Under the reference accident payoff, the corresponding value is $50(1 - .25) = 37.5$. The cushion may make B more willing to continue, but equilibrium behavior also depends on A's anticipation of that incentive. A may back down earlier, or both actors may adjust in a way that changes exposure.

The role asymmetry makes stable roles especially important. Report outcomes separately for A and B. Do not describe the treatment as a model of any particular country unless a separate case discussion justifies the mapping. Its purpose is to isolate unequal vulnerability in an abstract crisis.

6.4 Extension 4: rising cost of backing down

In this extension, backing down becomes more costly after earlier joint continuations. The actor who backs down loses 5 ECU for each previous step in which both actors continued. At step one the unilateral backing-down payment is 20. At step two it is 15, at step three 10, at step four 5, and at step five 0. The counterpart who continues still receives 80. If both back down, the cost is applied symmetrically to the equal outcome according to the displayed rule.

The cost represents an audience, reputation, or commitment penalty created by earlier escalation. It does not claim that real political audiences always punish compromise. The transparent schedule lets students examine a commitment problem: escalation may strengthen a public position while simultaneously making peaceful exit harder.

Suppose A backs down and B continues at step four after three earlier joint continuations. A receives $20 - 3(5) = 5$ and B receives 80. No step-four accident draw occurs because the action-based

EXTENDED EDITION · ASYMMETRIC CONSEQUENCES

How the crisis works

You are paired with another participant and keep role A or B throughout the session. Each crisis can last up to five steps.

At every active step, both actors simultaneously choose whether to back down or continue. If one backs down and the other continues, the actor who backs down receives 20 ECU and the actor who continues receives 80 ECU. If both back down, each receives 50 ECU.

If both continue, the platform stores one draw. Under rising risk, the accident probability is 5%, 10%, 15%, 20%, and 25% in steps one through five. An accident ends the crisis. If both survive joint continuation at step five, each receives 50 ECU.

When a concession ends the crisis, no accident draw occurs. The screen displays the current risk and the probability of passing all remaining steps without an accident if both always continued.

Rule for this session

If an accident occurs, A receives 0 ECU and B receives 20 ECU. All other payoffs remain the same.

Continue

Figure 6.2: Treatment-specific instructions for asymmetric accident consequences.

exit has priority. The earlier draws remain evidence that the pair had already accepted exposure three times.

Compare terminal depth as well as accident rates. A rising exit cost could delay backing down and increase exposure, but it could also make threats more credible and induce an earlier concession by the counterpart. The treatment tests the balance of those mechanisms within the classroom environment.

6.5 Extension 5: negotiated exit

Negotiated exit inserts a proposal stage before the Back down/Continue choice. Proposal rights alternate by step. The proposer selects how much of 100 ECU the responder will receive: 30, 40, 50, 60, or 70. The proposer receives the remainder. The responder then accepts or rejects privately. Acceptance ends the crisis immediately with the proposed split. Rejection leads both actors to the ordinary simultaneous action decision at the same step.

The finite menu avoids ambiguous entries and preserves a constant total of 100 in agreement. An offer differs from unilateral backing down because it can produce intermediate distributions such as 40/60. It differs from mutual backing down because one actor proposes and the other explicitly accepts. Alternating proposal rights prevents one role from controlling every bargaining opportunity.

An accepted offer reveals that the proposed allocation was chosen over the continuation options available at that moment. It does not reveal the responder's exact belief about the other action or the accident draw. Rejection likewise need not imply that the offer was considered unfair; the responder may expect a better outcome through continuation or a later proposal.

Useful report measures include proposal frequency, accepted offers, offered shares, step of agreement, and accidents after rejection. Keep the relevant denominator visible: an acceptance rate should

VERSIÓN EXTENDIDA · COSTO CRECIENTE DE CEDER

Cómo funciona la crisis

Formas una pareja con otro participante y mantienes el rol A o B durante toda la sesión. Cada crisis puede durar hasta cinco pasos.

En cada paso activo, ambos deciden simultáneamente entre ceder y continuar. Si uno cede y el otro continúa, quien cede recibe 20 ECU y quien continúa 80 ECU. Si ambos ceden, cada uno recibe 50 ECU.

Si ambos continúan, se realiza un solo sorteo guardado. En el riesgo creciente, la probabilidad de accidente es 5%, 10%, 15%, 20% y 25% en los pasos uno a cinco. Un accidente termina la crisis. Si ambos sobreviven la continuación conjunta del quinto paso, reciben 50 ECU cada uno.

Cuando una cesión termina la crisis no se realiza un sorteo de accidente. La pantalla muestra el riesgo del paso actual y la probabilidad de atravesar sin accidente todos los pasos restantes si ambos continuaran.

Regla de esta sesión

Después de cada continuación conjunta previa, ceder cuesta 5 ECU adicionales. El costo se descuenta del actor que cede y de ambos si ceden simultáneamente.

Continuar

Figure 6.3: The displayed schedule for the rising cost of backing down.

ACTOR A · PASO 1

Propuesta de salida negociada

Propón cuántos ECU recibirá el otro actor. Tú recibirás el resto de 100 ECU.

Selecciona una opción

Continuar

ACTOR B · PASO 1

Propuesta de salida negociada

60 ECU
El otro actor te ofrece

40 ECU
y conservarla

☐ Aceptar la propuesta

☐ Rechazar y pasar a la decisión de crisis

Continuar

(a) A proposer chooses the responder's share.

(b) The responder accepts or rejects privately.

Figure 6.4: A negotiated exit is available before the action decision.

divide accepted offers by offers that received a response, not by every possible crisis-step.

6.6 Extension 6: emergency mediation

The mediation extension presents an equal 50/50 proposal before the action decision. Each actor privately accepts or rejects. The proposal takes effect only if both accept. Bilateral acceptance ends the crisis immediately. Any rejection sends the pair to the ordinary simultaneous Back down/Continue decision at the same step, with the reference risk schedule.

Mediation creates a focal exit without giving the mediator authority to impose it. The equal proposal does not alter the total peaceful surplus, but it can coordinate actors who both prefer to avoid exposure and are uncertain whether the other will back down. Private responses prevent one actor from conditioning the current acceptance decision on observing the other's response.

ACTOR B · STEP 1

Mediator's proposal

The mediator proposes ending the crisis with 50 ECU for each actor. Your response is private; settlement requires two acceptances.

☐ Accept

☐ Reject

Continue

Figure 6.5: Private response to an emergency mediator's equal proposal.

The comparison with negotiated exit is instructive. Negotiation permits distributional bargaining but requires proposal selection and unilateral acceptance. Mediation fixes the distribution and requires bilateral acceptance. Communication supplies information without creating a settlement rule. These institutions should not be grouped into one generic category because they change different parts of the crisis.

6.7 Designing a treatment comparison

Checkpoint

For every extension, ask four questions: What exact stage or payoff changed? What remained constant? Which observed variable should respond first? Which alternative explanation remains possible? This structure keeps the debrief tied to the institution rather than to a memorable random outcome.

Select one reference session and one extended session whenever possible. Keep the number of crises, matching rule, language, payment conversion, timing, and instructor script constant. Assign participants or class sections before outcomes are known. Predefine a small set of measures, such as joint continuation at step one, probability of any exposure, accident conditional on exposure, terminal depth, peaceful agreement, and role-specific payment.

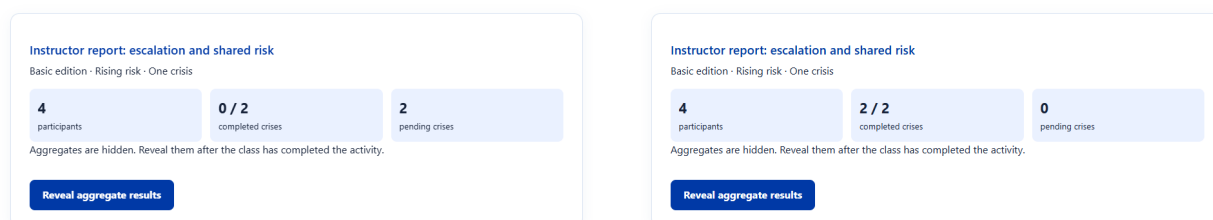
With a small class, display counts and describe the contrast. A difference of two accidents can look large when only a few joint continuations occurred. Show sampling uncertainty with an interval or simulation.

The private instructor report

7.1 Progress and the reveal control

The report begins with the session configuration, number of participants, expected pairs, completed pair-crises, and pending pair-crises. Aggregate outcomes remain covered until the instructor selects the reveal control. The cover state is retained in the instructor browser and is not an authorization mechanism for participants. The report omits participant codes and individual decisions.

An empty session reports zero completed observations and displays a dash whenever a rate has a zero denominator. A partial session distinguishes completed crises from pending ones. A complete session can reveal terminal forms, depth, exposure, agreements, messages, payments, and evolution across crises. The principal denominator is the pair-crisis, not the person and not the potential step.



(a) The report before any pair completes.

(b) A complete report before aggregate revelation.

Figure 7.1: Progress and privacy states of the instructor report.

7.2 Terminal forms and depth

The first distribution separates A backs down, B backs down, mutual backing down, accident, survival through the horizon, negotiated agreement, and mediated agreement. Keeping these categories separate prevents every non-accident outcome from being called “peace.” Unilateral backing down produces 20/80, mutual backing down produces 50/50, an offer can generate another split, and horizon survival records maximum exposure without an accident.

Terminal depth is the step at which the crisis ends. A step-one exit had no earlier accident exposure. An accident at step three implies two earlier survived draws and one failed draw at step three. The mean terminal step is a useful summary, but the full distribution shows whether a class concentrated on early exits or divided between rapid settlement and very long crises.

7.3 Exposure and accident rates

For each step, the report shows how many crises reached the decision, how many recorded joint continuation, and how many accidents occurred. The observed accident rate uses joint continuations as its denominator. It does not divide by all crises. In a small class the realized rate may be far from the programmed probability through ordinary sampling variation.

The report places the theoretical risk beside the realized rate. Do not use ten observations as a mechanical validation of a random generator. Instead, have students simulate many classes or construct an intuitive range of plausible outcomes. The stored draw makes each exposure auditable without publicly linking it to a person.

7.4 Institutional activity and evolution

The institutional section counts structured messages, direct proposals, accepted offers, mediator proposals considered, and bilateral mediation agreements. A zero is meaningful only when that institution was active. In the reference treatment, zero messages means that messaging was unavailable, not that participants refused to communicate.

The crisis-by-crisis table reports accidents, agreements, and mean payments for A and B. Under fixed matching, a trend may reflect bilateral learning or reputation. Under reassignment, it may reflect population learning, selection into later steps, or chance. A time pattern is descriptive unless the design supplies a comparison that identifies a causal change.

Feedback script

“Begin with denominators. How many crises could have produced an accident? How many reached step five? Were early exits unilateral, mutual, negotiated, or mediated? Now compare the payoffs of A and B. Which observed mechanism supports your explanation, and which belief remains unmeasured?”

7.5 Reading partial sessions

A partial report is operationally useful because it identifies whether the class is still active. It should not be treated as the final sample. Pairs that finish early may be systematically different from pairs still escalating, so early aggregates can be selected. Keep the cover on, identify stalled links privately, and wait for completion when feasible.

If a pair cannot finish because of a documented technical problem, record the exclusion and use completed pair-crises as the denominator. Do not invent an action, force a result through an administrator screen, or count a pending crisis as a peaceful exit. Transparent missingness is preferable to fabricated completion.

Class plans and discussion

8.1 Before, during, and after

Before class, select one learning objective, verify the configuration, test the room, confirm an even number, and open the private report. Prepare one numerical example but do not announce a supposedly dominant action. Ask participants to read the rules and complete comprehension independently. If incentives are used, state the conversion rule and payment procedure before the first decision.

During play, keep the room quiet and avoid interpreting choices aloud. Help with access privately. Do not tell one member of a pair that the counterpart is taking too long, because timing can become an unintended signal. If the whole class encounters a service problem, pause everyone and record the intervention.

After play, collect predictions before revealing aggregates. Begin with completion counts, then terminal categories, depth, and exposure. Discuss messages or agreements only if the selected institution activated those stages. End by separating outcome, strategy, and mechanism. This order prevents one dramatic accident from dominating all inference.

8.2 A fifty-minute plan

Minutes	Activity	Instructor focus
0–5	Access	Distribute unique links, confirm an even number, and keep the report private.
5–13	Rules	Explain the horizon, action priority, and conditional risks; answer procedural questions.
13–18	Comprehension	Allow individual corrections; do not coach strategic choices.
18–28	Crisis	Monitor completion and technical access without revealing actions.
28–32	Predictions	Record expected accidents, exit depth, terminal forms, and role payments.
32–42	Report	Reveal counts, reconstruct denominators, and compare predictions with outcomes.
42–50	Interpretation	Connect the observed mechanism to theory and state the limits of inference.

For ten crises, use a 75-minute session or split play and debrief across meetings. If a midpoint pause is pedagogically useful, decide it in advance and use the same pause across comparison groups. The pause itself can influence coordination and should be treated as part of the procedure.

8.3 Discussion questions

1. Why does cumulative survival require multiplying complements rather than adding risks?
2. What is the difference between uncertainty about the random draw and uncertainty about the counterpart?
3. When can Continue be individually attractive but jointly dangerous?
4. Does a long crisis show resolve, error, optimism, learning, or selection? What additional data would distinguish those accounts?
5. Why should unilateral and mutual backing down remain separate terminal categories?
6. How does a constant hazard change reasoning compared with an increasing hazard?
7. Can a nonbinding message coordinate behavior? Under what conditions can it transmit information?
8. Do asymmetric accident losses shift bargaining power toward the less exposed actor?
9. Can a rising cost of backing down create credibility while reducing flexibility?
10. What does an offer provide that the Back down button does not?
11. Why may a mediator's equal proposal become a focal point without changing the total surplus?
12. Which behavioral changes under repetition can be attributed to a particular partner?
13. How would public observation of choices change the strategic environment?
14. Which statistic in the report is most vulnerable to a misleading denominator?

8.4 Quantitative exercises

Exercise 1. Calculate the probability that the first accident occurs at step four under joint continuation at every step. The answer is

$$0.95 \times 0.90 \times 0.85 \times 0.20 = 0.14535.$$

Explain why the calculation includes survival through step three but does not include survival at step four.

Exercise 2. Under constant 15-percent risk, calculate the probability of at least one accident over five joint continuations:

$$1 - 0.85^5 = 0.5562947.$$

Compare it with 0.56395 under increasing risk. Explain why two schedules with similar cumulative danger may generate different step-specific decisions.

Exercise 3. Under the rising backing-down cost, reconstruct payments if A backs down at step four while B continues. Three previous joint continuations create a cost of 15. A receives $20 - 15 = 5$ and B receives 80. There is no accident draw in step four.

Exercise 4. A proposes a share of 60 to B at step one and B accepts. A receives 40 and B receives 60. Compare this agreement with the immediate alternatives. If B expected A to back down, B might seek 80; if both continued, they would activate the draw. Acceptance reveals a choice among available paths, not B's precise belief.

Exercise 5. A session contains twenty crises. Eight crises record at least one joint continuation, and two accidents occur. The accident rate per exposed crisis is 25 percent; the rate per crisis is 10 percent. Both are descriptive, but they answer different questions. A step-specific programmed hazard should be compared with draws at that step.

Exercise 6. Ten pairs reach step two, six jointly continue, and one accident occurs. The step-two realized accident rate is $1/6$, not $1/10$. The continuation rate among crises reaching the step is $6/10$. Identify which rate describes strategic behavior and which describes the random outcome conditional on behavior.

For the instructor

Ask every group to write the denominator before calculating a percentage. Most report-reading errors come from dividing accidents by participants, potential steps, or crises that never faced a draw. The report provides the counts needed to reconstruct each rate.

8.5 A fifteen-minute feedback script

Minutes 0–3: reconstruct one path without an accident and one path with a decision-based exit. Minutes 3–6: calculate cumulative survival. Minutes 6–9: reveal terminal forms and depth. Minutes 9–12: compare exposure and accidents. Minutes 12–15: connect the active institution to messages, agreements, costs, or unequal consequences and close with limits of inference.

Avoid asking who won before identifying how the crisis ended. A payment of 80 can follow the counterpart's backing down without a draw. A payment of 50 can follow mutual backing down, mediation, or survival through maximum exposure. Identical payments can arise from different processes. That observation shifts attention from final outcomes to strategic sequences.

Feedback script

"The class generated sequences of decisions, not a collection of isolated opinions. Let us identify when each pair could exit, when both chose exposure, and which part of the outcome depended on chance. We can then compare the institutions and ask what additional evidence would be needed to explain the motives."

Evidence, adaptation, and scope

9.1 Connection to the literature

Schelling (1960) developed the idea that actors can manipulate a shared risk when a fully controlled catastrophic threat would lack credibility. Powell (1987) analyzed sequential crisis bargaining and escalation under mutual destruction. The activity draws from that tradition by separating the deliberate decision to continue from control over the final random outcome. It does not reproduce a specific experiment or simulate nuclear weapons, geography, military capabilities, or complex private information.

The rising cost of backing down is related to models of domestic audiences (Fearon, 1994), in which escalating public commitments can transmit information and change who retreats. Subsequent evidence and criticism make it inappropriate to treat audience costs as universal. Here the cost is an explicit classroom parameter that isolates the tension between credibility and flexibility.

The communication treatment distinguishes private structured messages from public commitments. Kurizaki (2007) formally demonstrates that private communication and public threats can have different strategic consequences. The classroom messages remain costless and nonbinding; they should not be presented as costly signals. The mediation treatment relates to the distinction among third-party conflict-management techniques studied by Dixon (1996).

9.2 What one class can establish

The activity observes incentivized choices under known rules. It can describe continuation, exit step, realized accidents, payments, messages, offers, and acceptance. Random assignment of sessions to treatments can support a causal comparison within the classroom sample when implementation is held constant and uncertainty is reported.

The activity does not measure beliefs, emotion, ideology, risk preference, or motivation. It excludes civilian harm, externalities to third parties, uncertain hazard estimates, organizational chains of command, and coalitions. ECU are an abstraction and cannot represent the moral and human consequences of actual conflict. The pedagogical value comes from isolating a mechanism, not from claiming equivalence with a historical crisis.

Most participants are students and stakes are limited. Generalization to political leaders and real emergencies requires evidence beyond this activity. Present class results as behavior under the session's rules and as a prompt for theoretical reasoning. Do not use them as an estimate of what a named government would do.

Attention

Do not label a participant aggressive, cowardly, irrational, or peaceful. Report behavior under a stated rule. Decisions are private, results are aggregate, and the discussion evaluates mechanisms rather than identities.

9.3 Responsible adaptations

An instructor may change the number of crises, the payment conversion, or the discussion context while preserving the basic mechanism. Record every change and update instructions, comprehension, report labels, and analysis together. Never alter a payment only in the oral script while leaving the interface unchanged.

Historical framing can be added after play as an analytical application. Starting with named countries can introduce moral judgments, prior knowledge, national identity, and factual disputes before participants understand the mechanism. If a case is used, explain where the abstract assumptions fail and avoid mapping classroom actions directly onto the conduct of real leaders.

Free-text communication, public voting, groups larger than two, incomplete information, and endogenous alliances create substantively different games. They can be valuable future designs, but they should not be treated as minor interface variations. Each changes the strategy space, privacy requirements, report design, and interpretation.

Data, operation, and troubleshooting

10.1 Exported data and units of analysis

The export contains session, crisis, group, language, edition, treatment, matching mode, step-specific actions, messages, mediation responses, offers, offer responses, random draws, terminal step, terminal category, accident indicator, and role-specific payments. Step arrays retain five positions. Steps not reached are empty, which distinguishes a missing decision from an explicit Back down or Continue choice.

The primary observation is a pair-crisis. Steps are nested within the crisis, and crises are nested within participants and matching histories. Descriptive class analysis should show counts and denominators. Formal analysis should use methods that respect dependence. Five potential steps must not be treated as five independent observations.

Only active crises enter the report. A one-crisis session does not count nine technical rounds that were never active. Pending crises remain outside outcome aggregates and appear in progress counts. Wait for completion or document exclusions; do not fill missing actions.

10.2 Recommended derived variables

Useful derived variables include any exposure, number of joint continuations, terminal depth, early peaceful exit, accident conditional on exposure, agreement before the action decision, message-action consistency, offered share, acceptance, and total pair payoff. Define each variable before inspecting treatment differences.

For accident risk, keep step-specific denominators. For bargaining, separate proposals from responses. For mediation, distinguish individual acceptance from bilateral agreement. For repeated sessions, retain crisis order and the identity-free matching structure so that standard errors or descriptive intervals can reflect repeated participation.

The total pair payoff measures efficiency within the abstract game: it is 100 for reference peaceful exits and zero after a reference accident. Role-specific payoffs measure distribution. Reporting only the total hides unequal settlements; reporting only role averages hides destroyed surplus. Both are needed.

10.3 Troubleshooting table

Problem	Recommended action
Odd number of participants	Add or remove a link before starting; each group requires two people.
Reassignment with one pair	Use at least four participants; with two people no alternative counterpart exists.
One participant remains waiting	Verify privately that the counterpart opened the correct link and completed the active screen. Do not manufacture a response.
Old participation link	Create a current session and redistribute its links. Do not reset a database that contains sessions that must be preserved.
Report shows zero	Check whether any pair reached its result page. An incomplete crisis does not enter aggregates.
Rate displays a dash	The denominator is zero. Do not replace the dash with zero percent.
Unexpected outcome	Reconstruct actions, terminal step, and stored draw. Backing down ends the step before any new draw.
Screens from another activity	The service is not isolated to the correct family. Stop the launch and request a configuration check.
Report is hard to project	Increase browser zoom and project one report section at a time rather than a full vertical screenshot.
Participant reloads a page	Confirm the current stage. A stored draw must remain unchanged and a submitted choice must not generate a second observation.

10.4 Final instructor checklist

1. Confirm configuration, language, institution, matching rule, and an even number.
2. Open the private report and keep its address away from the projected screen.
3. Distribute one unique participation link per person.
4. Verify comprehension before interpreting any behavior.
5. Keep the room quiet and avoid revealing choices during a crisis.
6. Wait for completed pair-crises and inspect pending counts.
7. Collect predictions before revealing aggregates.
8. Read counts and denominators before percentages.
9. Distinguish backing down, agreement, horizon survival, and accident.
10. Close with limits of inference and protect participant privacy.

Glossary and additional problems

11.1 Operational glossary

Accident: a random terminal outcome that can occur only after two Continue choices. **Backing down:** an action that ends the crisis before a draw in that step. **Joint continuation:** the action profile that activates the risk. **Escalation:** movement to a later crisis step after surviving. **Exposure:** an actual opportunity for an accident, not a merely potential step. **Horizon:** the fifth and final step. **Conditional risk:** the probability of an accident given that the step is reached and both actors continue. **Cumulative survival:** the product of the probabilities of no accident. **Strategic uncertainty:** uncertainty about another actor's private action. **Negotiated exit:** a proposed allocation that the responder accepts. **Mediation:** a neutral equal proposal that requires bilateral acceptance. **Backing-down cost:** a deduction that increases with earlier joint continuations in the relevant extension.

11.2 Additional problems

Checkpoint

A complete solution should state the available information, conditioning event, formula, numerical substitution, unit, and interpretive limit. This discipline prevents a rate from being used to answer a question different from the one its denominator supports.

Problem A. Derive the probability of reaching step five when both actors jointly continue through the first four steps:

$$0.95 \times 0.90 \times 0.85 \times 0.80 = 0.5814.$$

Reaching step five does not mean surviving its draw.

Problem B. At step five, suppose an actor believes with probability $q = .4$ that the counterpart will back down and the accident risk is .25. Compute

$$V_C = 80(.4) + 50(.6)(.75) = 54.5$$

and $V_B = 20 + 30(.4) = 32$. Under risk neutrality and those beliefs, Continue has the larger monetary expected value. Explain why a different q , utility function, or continuation payoff can change a comparison elsewhere in the game.

Problem C. Under asymmetric accident consequences, B receives 20 after an accident. At step five, conditional on A continuing, B's monetary value from continuing is $20p + 50(1 - p)$. With $p = .25$, it equals 42.5. Explain how this cushion may make B more willing to continue and how A's anticipation may change the observed result.

Problem D. Compare an offer of 60 to the responder with mutual backing down at 50 each. The responder gains 10 and the proposer loses 10 relative to the equal outcome. Explain how the offer can resolve incompatible expectations about who should back down and why acceptance does not reveal an exact accident belief.

Problem E. Design a comparison between communication and mediation. Hold payments, risk, horizon, matching, and timing constant; randomly assign sessions; predefine early exit and accident measures; and explain why message counts have no direct equivalent in the mediation condition.

Problem F. A class observes three accidents among twelve joint continuations pooled across steps. Explain why comparing 3/12 with a single programmed probability can be misleading. Propose a table that separates the five hazards, exposures, accidents, and exact binomial uncertainty at each step.

Problem G. In a fixed-partner session, the mean terminal step falls from 3.2 in the first five crises to 1.8 in the final five. Give at least four explanations consistent with the result. Identify one additional measurement or comparison that would help distinguish each explanation.

Bibliography

- Dixon, W. J. (1996). Third-party techniques for preventing conflict escalation and promoting peaceful settlement. *International Organization*, 50(4), 653–681. <https://doi.org/10.1017/S0020818300033543>.
- Fearon, J. D. (1994). Domestic political audiences and the escalation of international disputes. *American Political Science Review*, 88(3), 577–592. <https://doi.org/10.2307/2944796>.
- Kurizaki, S. (2007). Efficient secrecy: Public versus private threats in crisis diplomacy. *American Political Science Review*, 101(3), 543–558. <https://www.cambridge.org/core/journals/american-political-science-review/article/abs/efficient-secrecy-public-versus-private-threats-in-crisis-diplomacy/B1150C7FD2400BE8E7F60F8C2D4141D7>.
- Powell, R. (1987). Crisis bargaining, escalation, and MAD. *American Political Science Review*, 81(3), 717–735.
- Schelling, T. C. (1960). *The Strategy of Conflict*. Harvard University Press.
- Lin-Greenberg, E. (2024). Wars are not accidents: Managing risk in the face of escalation. *Foreign Affairs*, 103(6), 20–25.