

ΠΜΣ Ενέργειας, Τμήμα ΔΕΣ, ΠαΠει

Ανάλυση Γεωπολιτικού Ρίσκου στην Κρίση των Πυραύλων της Κούβας (1962)



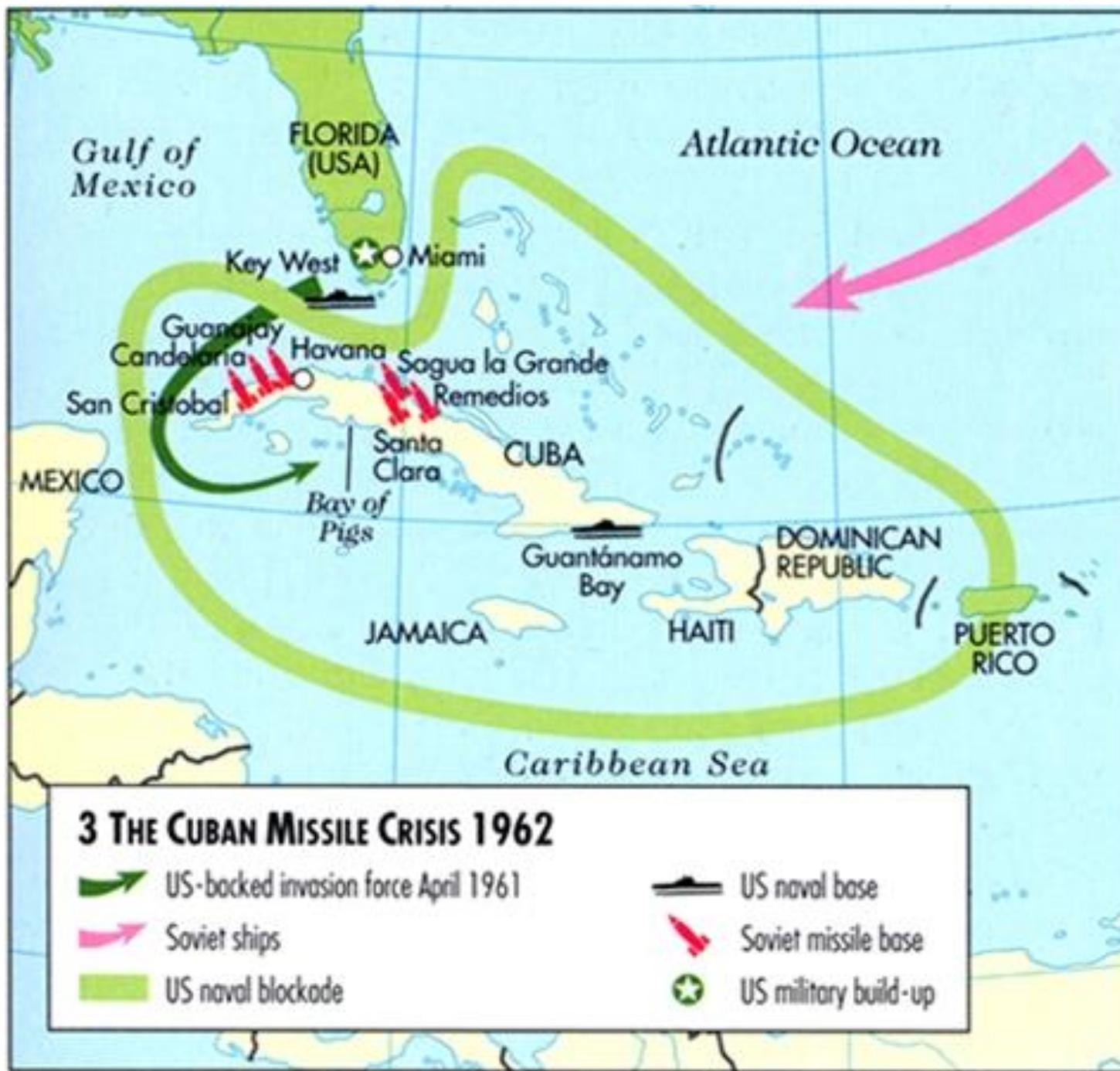
Ιωάννης Αθ. Παραβάντης

Επίκουρος Καθηγητής (μόνιμος)

19 Δεκεμβρίου 2015

CUBAN MISSILE CRISIS

- **1962** Soviet leader Nikita Khrushchev, worried by U.S. nuclear missiles in Turkey, sends more than 40 medium-range nuclear-capable missiles to Cuba
- **October 14** U.S. spy planes take the first clear pictures of the missiles. Moscow denies deployment.
- **October 22** President Kennedy imposes a sea blockade of Cuba and puts armed forces on heightened alert, ready to order a strike on Cuba
- **October 26** Moscow announces it will remove missiles in return for guarantees U.S. will never attack Cuba. Secret deal removes U.S. missiles from Turkey



KEVIN COSTNER

THIRTEEN
DAYS



“EXTRAORDINARY!
It keeps you hanging on every twist and turn.”
ROBERT DE NIRO, ROBERT DUVALL



• 4 out of 45 •









Ένας λήπτης απόφασης (decision maker):

- ⌘ **Απόφαση** (decision)

Μερικοί λήπτες αποφάσεων («παίκτες» ή players):

- ⌘ **Παίγνιο** (game)

Πολλοί λήπτες αποφάσεων («δρώντες» ή agents):

- ⌘ **Πολύπλοκο Σύστημα** (complex system)
 - ⌘ η διεθνής αναρχία αποτελεί αναδυόμενο φαινόμενο (emergent phenomenon) ενός πολύπλοκου συστήματος, του οποίου οι δρώντες συμμετέχουν σε ένα **δίλημμα φυλακισμένων** (prisoner's dilemma), το δίλημμα ασφάλειας (security dilemma)!

THEORY OF
GAMES
AND
ECONOMIC
BEHAVIOR

JOHN VON NEUMANN
AND
OSKAR Morgenstern



THE STRATEGY OF CONFLICT

With a new Preface by the author

THOMAS C. SCHELLING

Βασικές έννοιες της **Θεωρίας Παιγνίων** (Game Theory):

- * διαδραστική λήψη αποφάσεων (interactive decision making)
 - ※ από πολλαπλούς λήπτες (decision makers), που λέγονται «**παίκτες**» (players)
 - ※ στρατηγικά παίγνια, με αλληλεξάρτηση
- * **ορθολογικότητα** (rationality)
 - ※ οι παίκτες επιλέγουν εκείνες τις κινήσεις (moves) ή στρατηγικές (strategies), που τους οδηγούν σε εκβάσεις (outcomes) με μεγαλύτερες ανταμοιβές (payoffs)

Υπάρχουν δυο βασικά είδη παιγνίων:

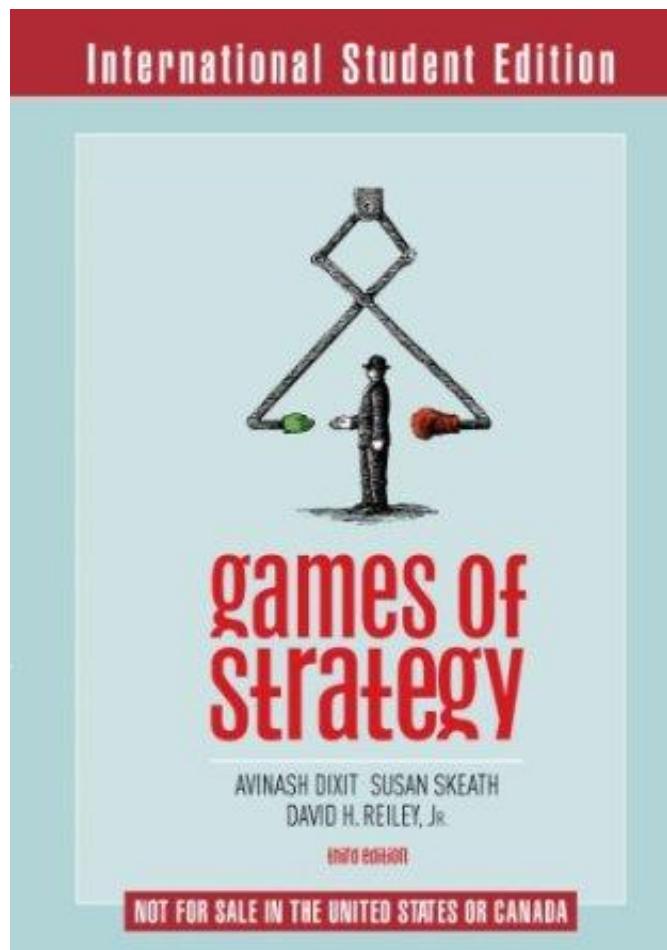
- * **παίγνια ταυτόχρονων κινήσεων** (simultaneous move games) που λέγονται και στατικά παίγνια (static games)
 - ※ με παιγνιακά μοντέλα ταυτόχρονων κινήσεων αναλύονται και τα παίγνια κρυφών (hidden) κινήσεων.
- * **παίγνια διαδοχικών κινήσεων** (sequential move games) που λέγονται και δυναμικά παίγνια (dynamic games)

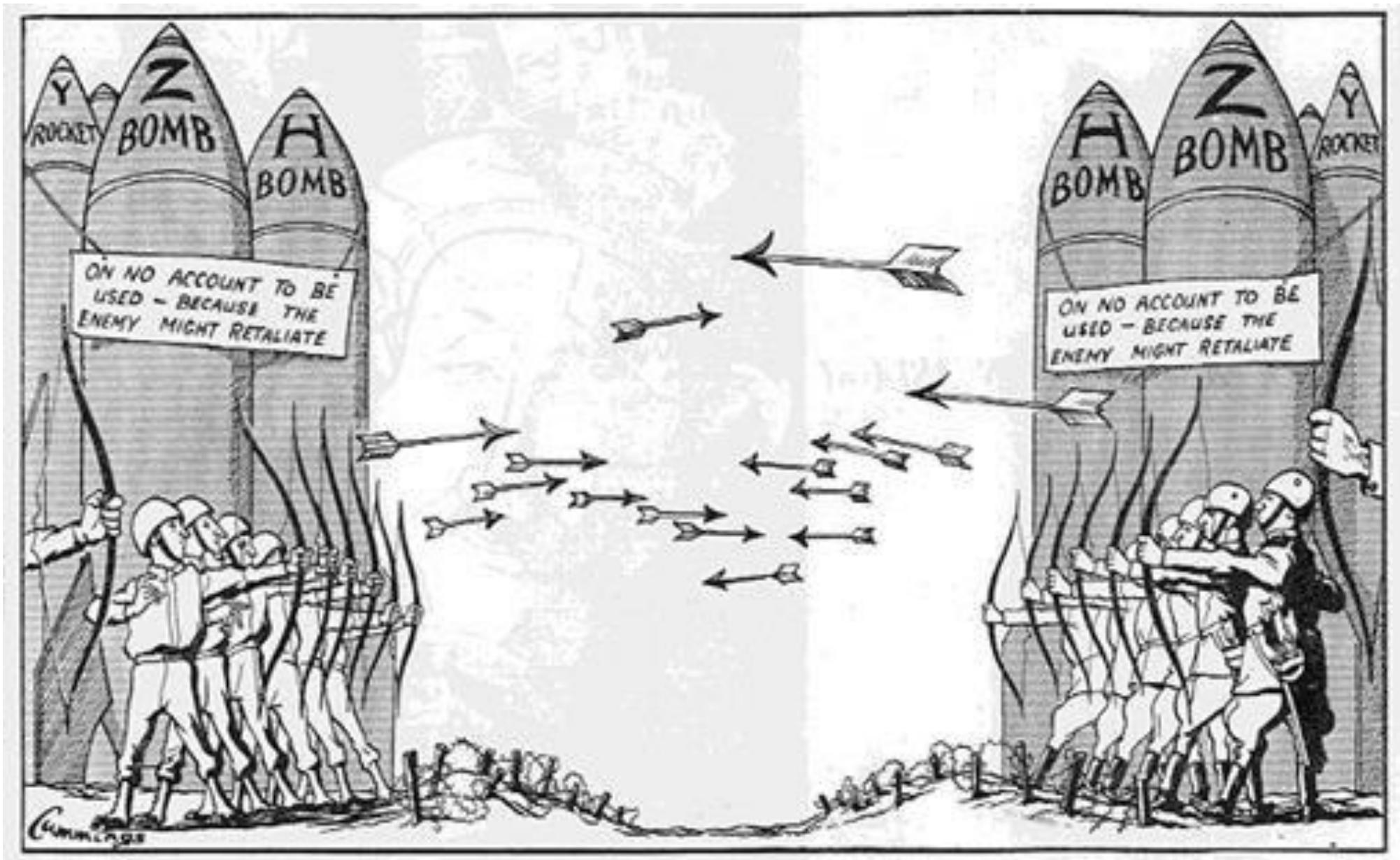
Πως «επιλύουμε» ένα παίγνιο;

- ⌘ Τα παίγνια δεν είναι μαθηματικά αλλά **στρατηγικά** προβλήματα.
- ⌘ Ως εκ τούτου, δεν «επιλύονται» αλλά **αναλύονται**.
- ⌘ Η ανάλυση καταλήγει στον εντοπισμό των **βέλτιστων στρατηγικών** για κάθε παίκτη.
- ⌘ Όταν όλοι οι παίκτες επιλέξουν τις βέλτιστες στρατηγικές τους, προκύπτει η **ισορροπία** (equilibrium) του παιγνίου.
- ⌘ Είδη ισορροπίας είναι η **ισορροπία εστιακού σημείου** (focal point) ή **Schelling**, η **ισορροπία Nash** (Nash equilibrium) και η **ισορροπία κυρίαρχων στρατηγικών** (dominant strategy equilibrium).
 - ⌘ Συχνά ένα παίγνιο έχει πάνω από μια ισορροπίες
 - ⌘ Μπορεί ένα παίγνιο να μην έχει ισορροπία.

Για την ανάλυση της Κρίσης της Κούβας, βασιζόμαστε στην προσέγγιση των **Dixit & Skeath (Games of Strategy, 3rd edition, Norton, 2010)**, που αναλύουν την κρίση

- * ως **παίγνιο διαδοχικών κινήσεων** (sequential move game)
- * κάνοντας χρήση της έννοιας της **ακροβασίας** (brinkmanship).



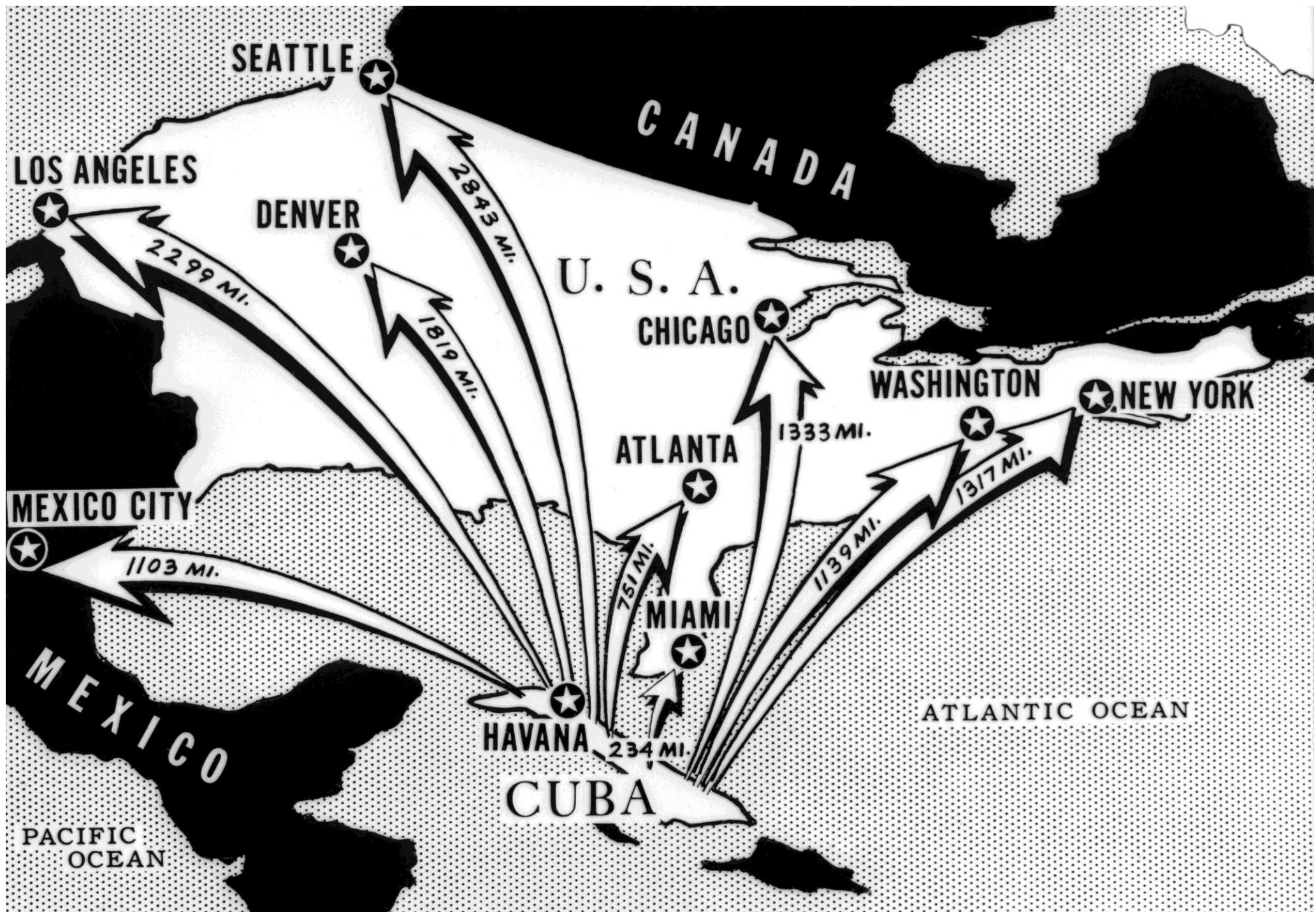


Πως βρούμε την **ισορροπία** στα **παίγνια διαδοχικών κινήσεων**;

- ★ Για την ανάλυση των παιγνίων διαδοχικών κινήσεων χρησιμοποιούμε **παιγνιακά δένδρα** (game trees), που αναφέρονται και ως «εκτενείς φόρμες» (extensive forms).
- ★ Βασική τεχνική επίλυσης (solution concept) των παιγνίων διαδοχικών κινήσεων είναι η **οπισθόδρομη επαγωγή** (backwards induction), που οι **Dixit & Skeath (2010)** ονομάζουν rollback.

Ας δούμε πως καταστρώνετε ένα παιγνιακό μοντέλο για την κρίση στην Κούβα.





THE WEATHER
By E. Weather Bureau Forecast
Philadelphia and Vicinity
Cloudy with showers early. Two
day becoming partly cloudy in
afternoon. High 70 upper 70s
Sunday and Monday and
Wednesday. Northernly winds
10 to 15 miles an hour Tuesday.
COMPLETE WEATHER DATA
ON PAGE 28

THE OLDEST DAILY NEWSPAPER IN THE UNITED STATES—FOUNDED 1771

The Philadelphia Inquirer

PUBLIC LEDGER
AN INDEPENDENT NEWSPAPER FOR ALL THE PEOPLE

FINAL
CITY EDITION

September Circulation: Daily, 1,100,000; Sunday, 1,100,000.

TUESDAY MORNING, OCTOBER 22, 1962
Volume, No. 100, Philadelphia, Pa., U.S.A. 1962

KMEL 340 AM • WFL-TV CH. 4

FIVE CENTS

Kennedy Orders Cuba Blockade, Calls Island Soviet Missile Base; Navy to Sink Defiant Red Vessels

Bristol Girl Is Strangled In Choir Loft

10-Year-Old Victim
Of Assault Found
By Her Father

By KIRKIE KIRK
and JOSEPH C. GOLDBECK
A 10-year-old girl's body was
hanging from a piano wire in the
choir loft of St. Mark's
Catholic Church in Bristol
yesterday, after being strangled.

The victim, Carol Ann DeGrazia,
of 80 Main Street, Bristol,
was found under a
stained-glass window at the

Program of Action

EST. The United States, "to hell this offensive
building" in Cuba, is imposing "a strict quarantine
on all offensive military equipment under shipment
to Cuba." All ships of any kind bound for Cuba are
to be turned back if they are found to contain cargo of
offensive weapons. This embargo also will be extended to
"other carriers" if need be—aircraft and
airplanes.

ECORD: Surveillance of Cuba and its military building
will be stepped up and the U. S. armed forces
have been ordered "to prepare for any eventualities."

RECORD: U. S. policy will be to regard any nuclear mis-
sile launched from Cuba against any nation in the
Western Hemisphere as an attack by the Soviet
Union on the United States requiring full retaliation
against the Soviet Union.

FOURTH: The U. S. naval base at Guantanamo, on
the eastern tip of Cuba, has been reinforced. U. S.
dependents there have been evacuated and additional
military units have been ordered to stand by on
alert.

FIFTH: An immediate meeting of the Organization of
American States (OAS) has been called to "assess
the threat to hemispheric security" and to
value the Rio Treaty for inter-American defense. "In
view of the emergency,"



PRESIDENT KENNEDY ADDRESSING NATION

BY AP Wirephoto. The President called on Soviet Premier

40 Warships, 20,000 Men Start Siege
President Cites Kremlin Deceit In Atom Buildup

Sonic Booms Jar
Floridians as Jets
Roar Into Action

From Our Wire Services
SAN JUAN, Puerto Rico
Oct. 22.—The U. S. Navy announced Sunday night that
more than 40 ships and 20,000 people had
been originally scheduled to arrive in
Puerto Rico to participate in maneuvers against
bombers capable of carrying nuclear weapons had
been now are "returning unharmed to their
bunkers" of Cuba.

The men and ships were to
have been in the Puerto Rican
area under the announced intention
of participating in maneuvers against
Soviet-bomber aircraft. They

By LEWIS GULICK
WASHINGTON, Oct. 22 (AP)—President Kennedy
ordered a U. S. "quarantine" blockade of Cuba Monday
night, saying the Soviets were sending Prime Minister
Fidel Castro offensive weapons able to ruin nuclear
civilization on all the Americas.

Mr. Kennedy spoke in a grim emergency nation-wide
radio-television address in which he disclosed that
more than 40 ships and 20,000 people had
been originally scheduled to arrive in
Puerto Rico to participate in maneuvers against
bombers capable of carrying nuclear weapons had
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Text of Mr. Kennedy's
speech on Page A1. Inter-
active and Background
Articles, Pictures, Com-
ment and Related News on

Απλό μοντέλο με «ενδοτικούς» Σοβιετικούς

U.S., USSR

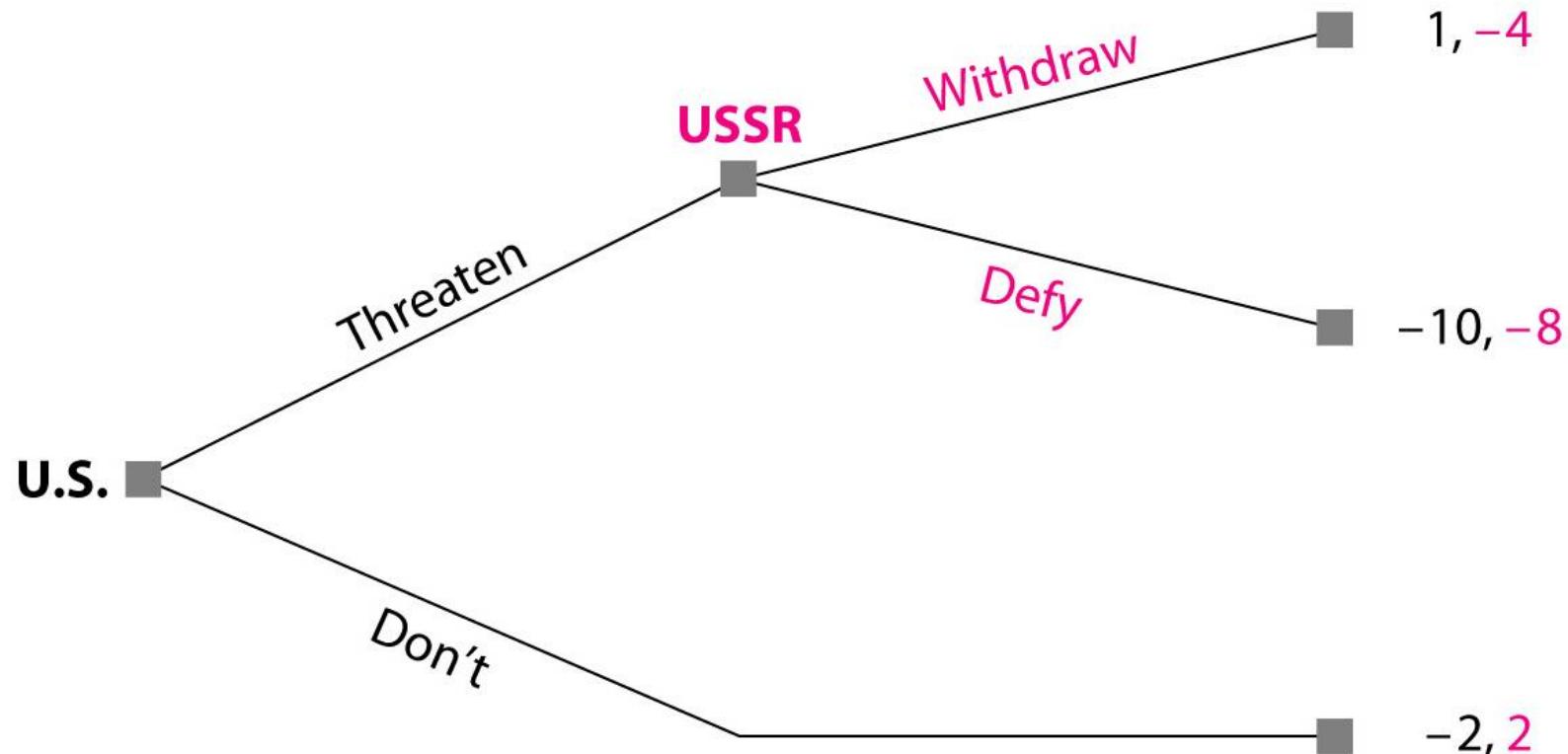


FIGURE 14.1 The Simple-Threat Model of the Crisis

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Εναλλακτικό απλό μοντέλο με «σκληροπυρηνικούς» Σοβιετικούς

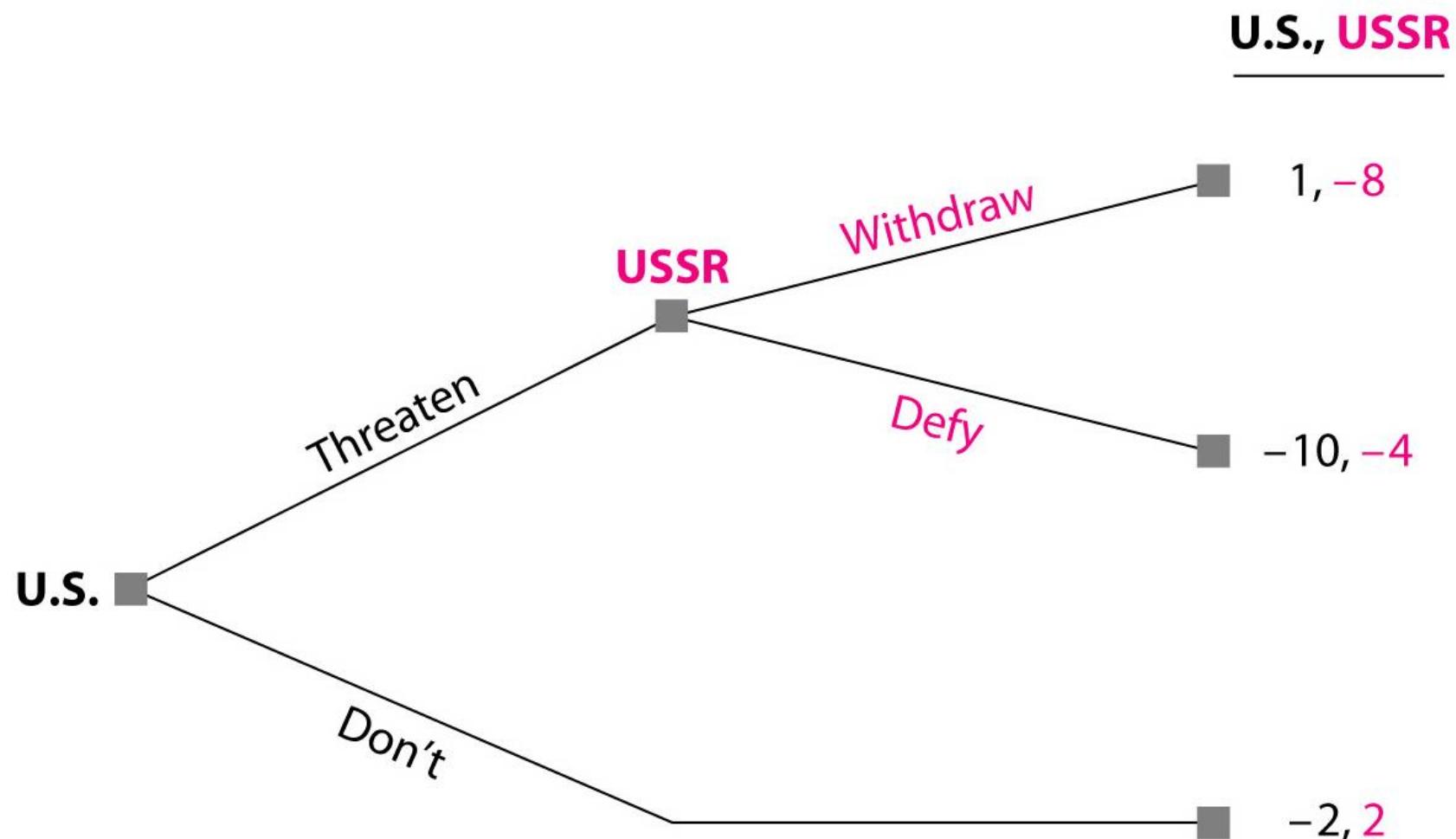


FIGURE 14.2 The Game with Hard-Line Soviets

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Είδαμε δυο **απλά** μοντέλα:

- ⌘ το πρώτο παράστησε τους Σοβιετικούς ως **ενδοτικούς** (soft)
- ⌘ το δεύτερο παράστησε τους Σοβιετικούς ως **σκληροπυρηνικούς** (hardliners).

Πως κατασκευάζεται ένα πιο ρεαλιστικό παιγνιακό μοντέλο;

Στην πραγματικότητα, οι Αμερικάνοι δεν μπορεί να ήταν σίγουροι για τους Σοβιετικούς! Άρα, η ερώτηση που θα έπρεπε να απαντηθεί είναι:

- ⌘ Ποια είναι η **πιθανότητα** (probability) να είναι οι Σοβιετικοί σκληροπυρηνικοί;

Πως υπολογίζουμε (μαθηματικά) την πιθανότητα να είναι οι Σοβιετικοί σκληροπυρηνικοί;

Για να καταλάβουμε τι είχαν στο μυαλό τους οι δρώντες (agents) δηλαδή οι παίκτες του παιγνίου εκείνη την εποχή, ανατρέχουμε στις **πηγές** (sources).









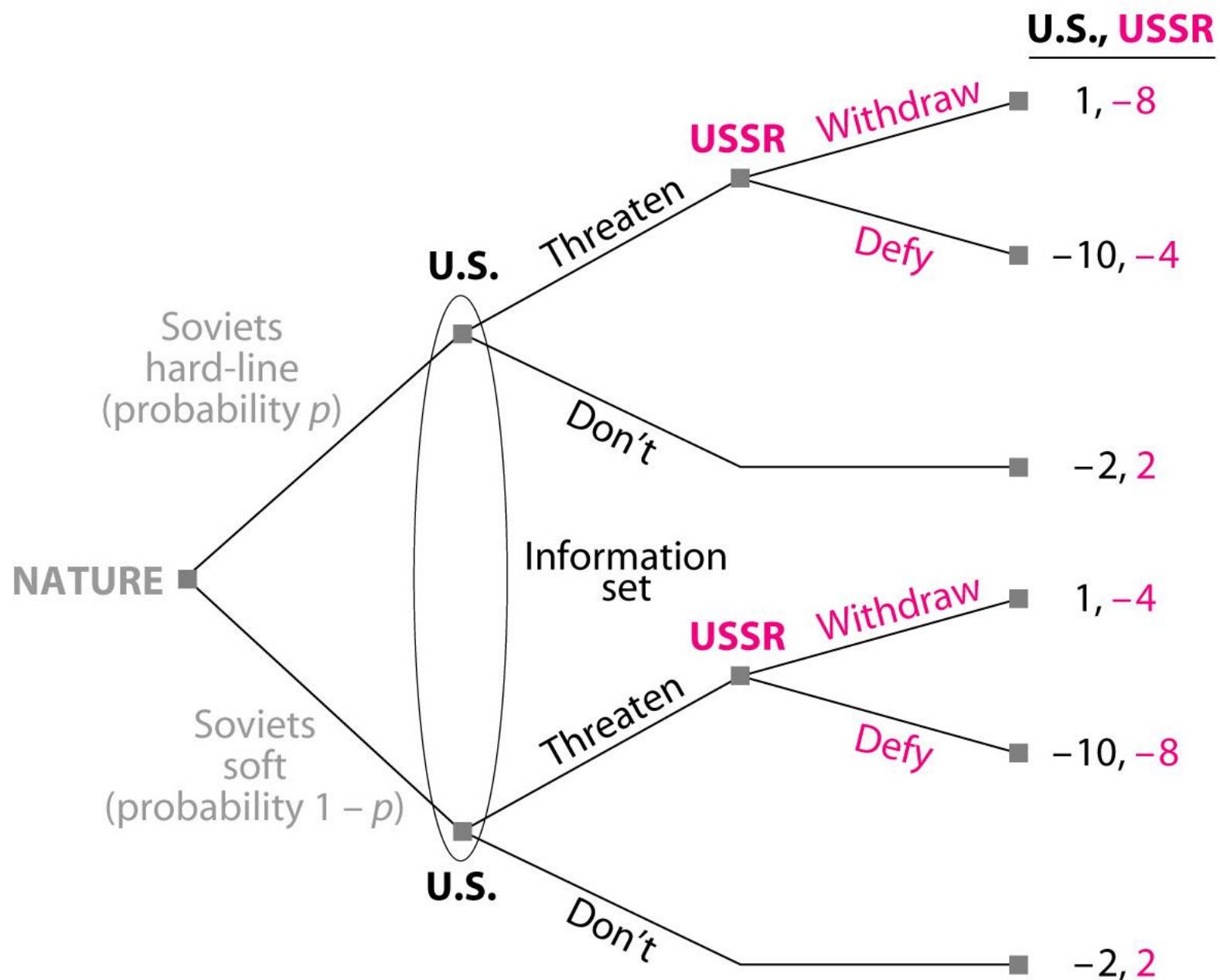


FIGURE 14.3 The Threat with Unknown Soviet Payoffs

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All these factors made the outcome of any decision by the top-level commander on each side somewhat *unpredictable*. This gave rise to a substantial risk of the “threat going wrong.” In fact, Kennedy thought that the chances of the blockade leading to war were “between one out of three and even” (*Essence*, 1).

$$p = \frac{1}{3} \sim \frac{1}{2} = 0.33 \sim 0.5$$

Ακροβασία (brinkmanship):

- ✿ διατυπώνοντας μια πιθανοτική απειλή (probabilistic threat)
 - ✿ **q**: πιθανότητα να προχωρήσουν οι Αμερικάνοι σε πυρηνικό πόλεμο, εφόσον οι Σοβιετικοί φανούν σκληροπυρηνικοί
 - ✿ **1-q**: πιθανότητα να φανούν οι Αμερικάνοι ενδοτικοί (δηλ. να αποδεχθούν τους πυραύλους στην Κούβα) εφόσον οι Σοβιετικοί φανούν σκληροπυρηνικοί
 - ✿ σαν **Ρωσική ρουλέτα**, με πιθανότητα να εκπυρσοκροτήσει το όπλο ίση με q.



Στο παίγνιο της πιθανοτικής (ή στοχαστικής) ακροβασίας, οι Σοβιετικοί δεν γνωρίζουν την έκβαση του παιγνίου, εάν επιδείξουν σκληροπυρηνική συμπεριφορά!

Για παράδειγμα, για τις ΗΠΑ, που η ανταμοιβή είναι -10 εάν γίνει πυρηνικός πόλεμος (με πιθανότητα q) και -2 (με πιθανότητα $1-q$) εάν δεν γίνει, η συνολική (αναμενόμενη ή expected) ανταμοιβή (εφόσον οι Σοβιετικοί αποδειχθούν σκληροπυρηνικοί) είναι:

$$(-10)q + (-2)(1-q) = -10q - 2 - 2q = -2 - 8q$$

Παρόμοιοι υπολογισμοί γίνονται για τις υπόλοιπες περιπτώσεις.

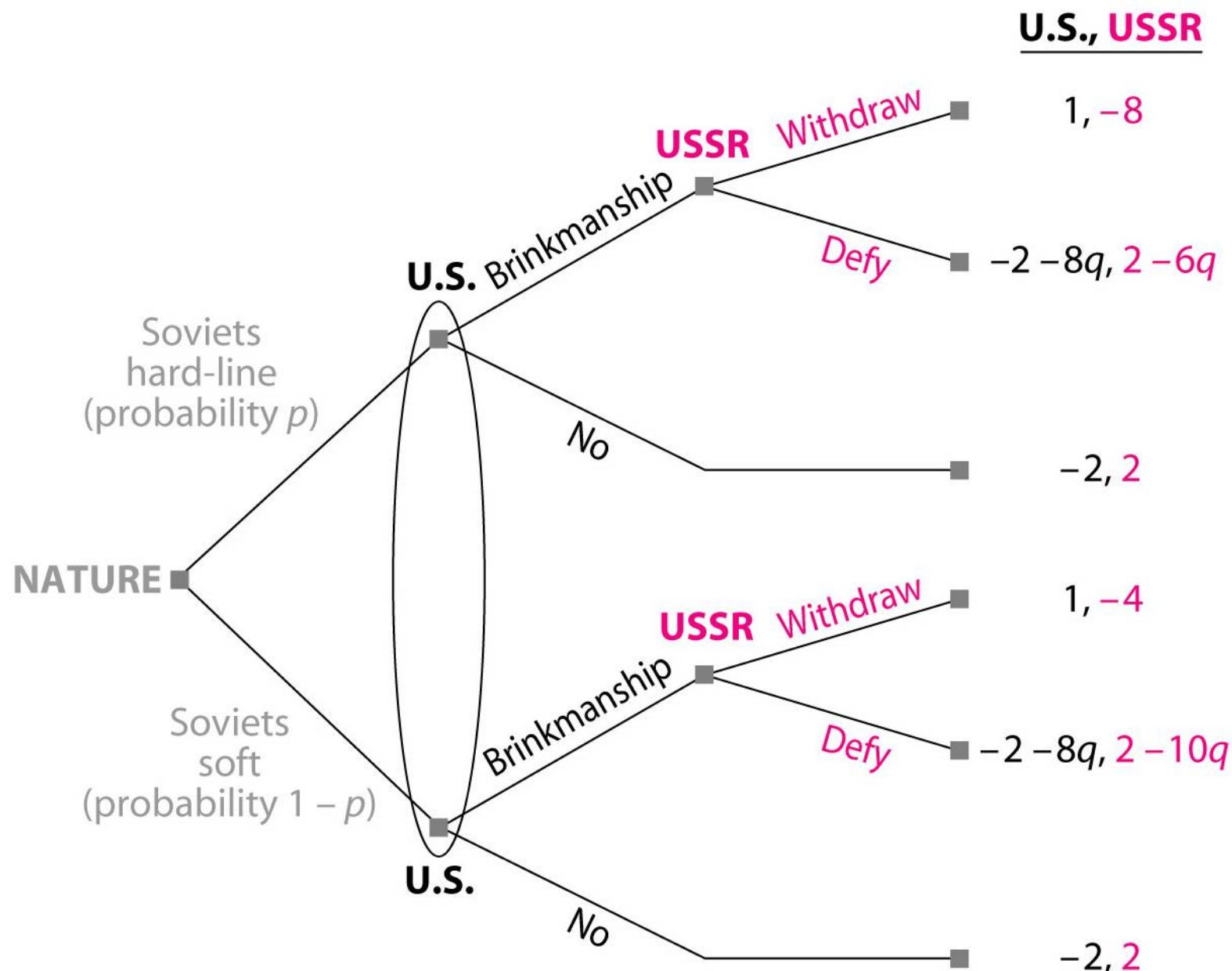


FIGURE 14.4 The Brinkmanship Model of the Crisis

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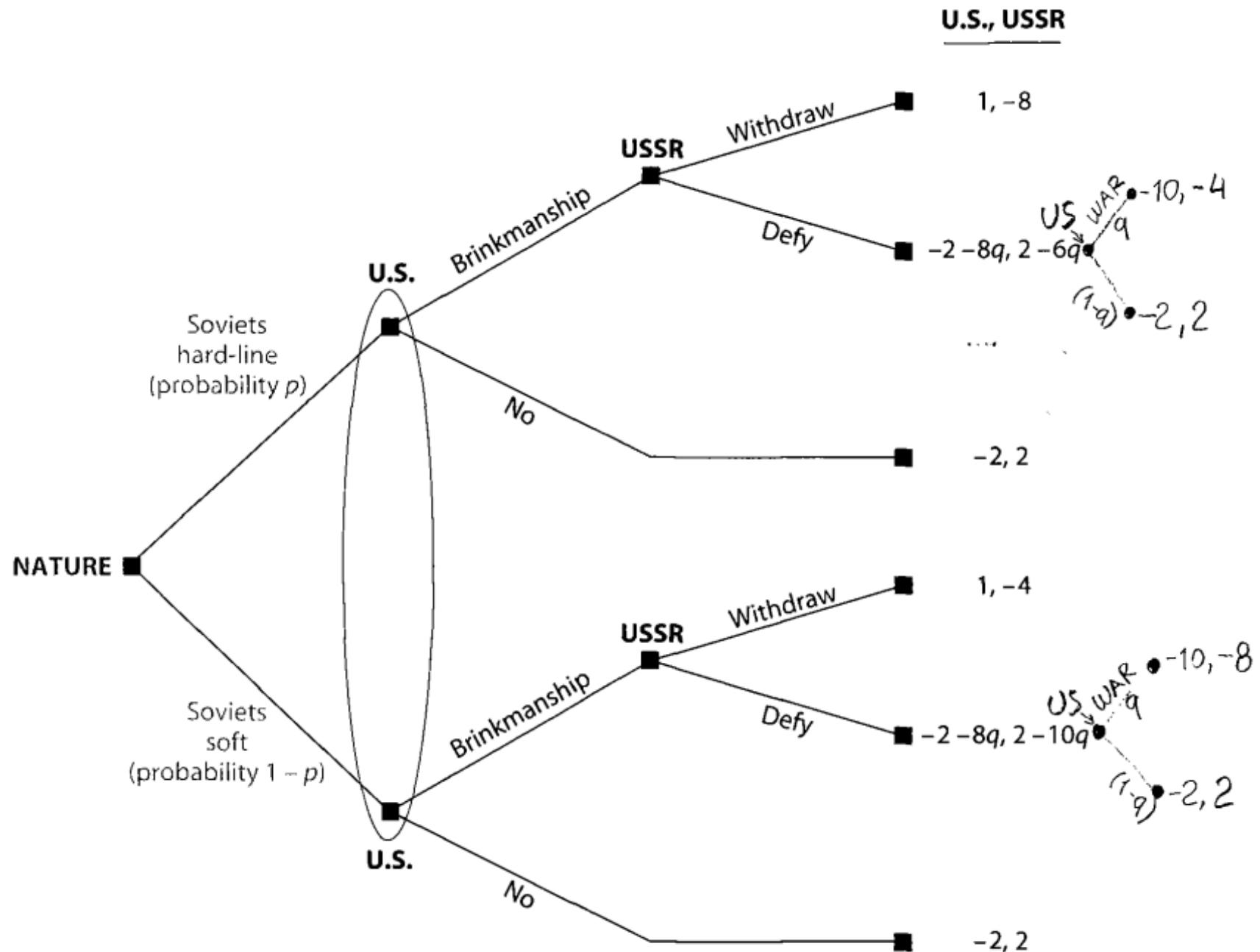


FIGURE 14.4 The Brinkmanship Model of the Crisis

Η ανάλυση του παιγνιακού μοντέλου με την ακροβασία αποκαλύπτει ότι

- ⌘ Για να φανούν οι Σοβιετικοί ενδοτικοί (δηλ. να πεισθούν ότι οι ΗΠΑ θα πραγματοποιήσουν την απειλή για πυρηνικό πόλεμο, εάν οι σοβιετικοί πύραυλοι δεν απομακρυνθούν από την Κούβα), πρέπει η Αμερικανική απειλή να περιέχει τουλάχιστον 60% πιθανότητα πολέμου!
- ⌘ Αυτό αποκαλείται συνθήκη **αποτελεσματικότητας** της απειλής (effectiveness condition).
- ⌘ Για να πραγματοποιήσουν οι ΗΠΑ την απειλή, πρέπει η πιθανότητα πολέμου (δηλ. σκληροπυρηνικής απάντησης των Σοβιετικών) να είναι μικρότερη από μια ανώτερη τιμή (που θα είναι ανεκτή στους Αμερικανούς)!
- ⌘ Αυτό αποκαλείται συνθήκη **αποδεκτότητας** της απειλής (acceptability condition).

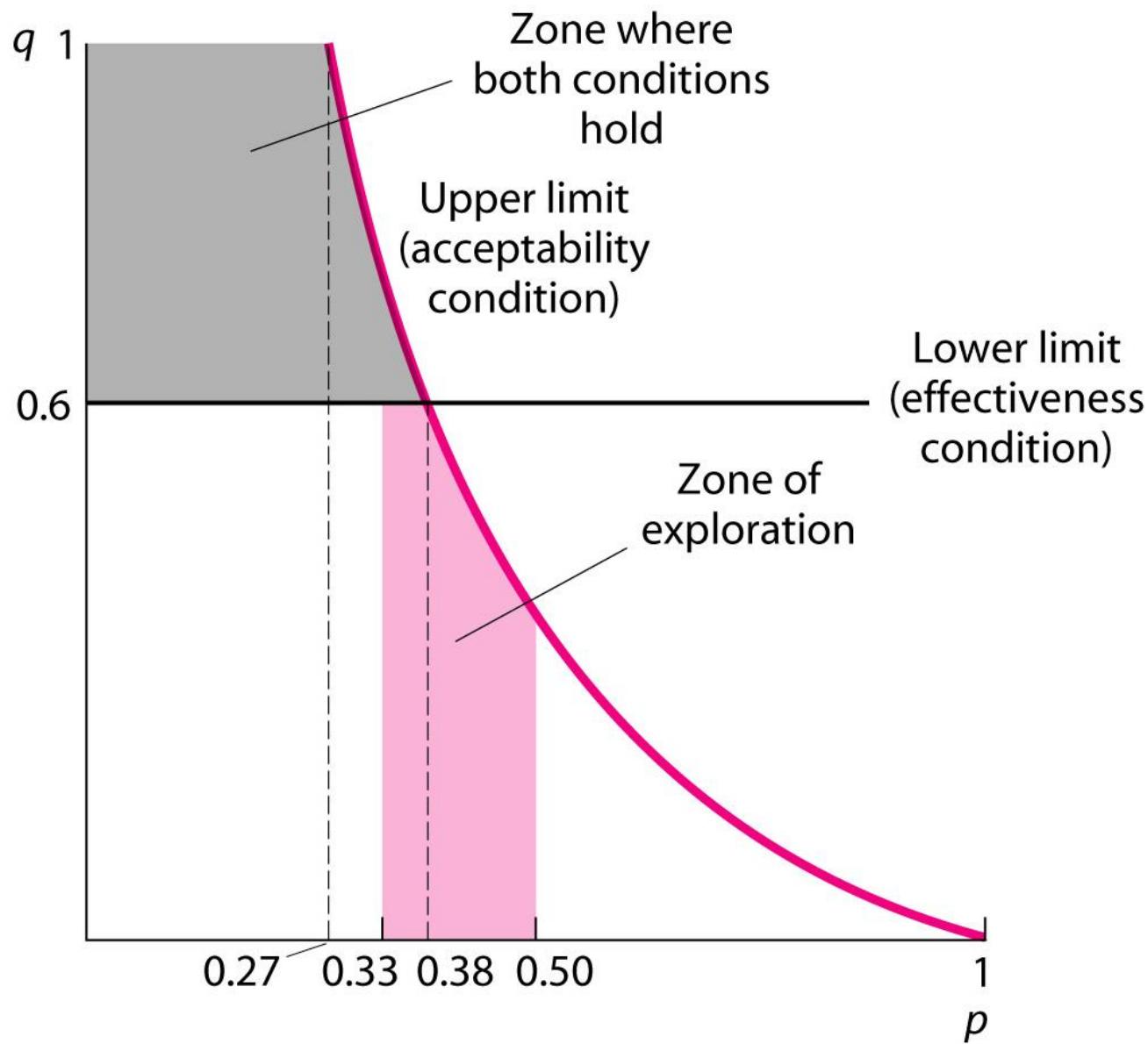


FIGURE 14.5 Conditions of Successful Brinkmanship

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RED ENVOY EVADES ANSWER ON CUBA MISSILE SITES

Adlai Blows Top, Tongue-Lashes Zorin in the UN

By ANITA EHRMAN

Hearst Headline Service Special to N. Y. Journal-American

UNITED NATIONS HQ., Oct. 26.—The usually affable and proper Adlai E. Stevenson blew his top in the UN Security Council yesterday after being goaded beyond endurance by Soviet Ambassador Valerian Zorin.

His face red with anger and his well-controlled voice shaking with emotion, Mr. Stevenson tossed diplomatic niceties aside and vowed he would wait "until hell freezes over" for Zorin to give a "yes or no" to his question whether there were Soviet missiles in Cuba. The Russian, in turn, called Mr. Stevenson a liar.

The viper-tongued Zorin, whose face also turned red with anger after he had unsuccessfully tried to hold the infuriated Mr. Stevenson up to ridicule, shouted back that "I am not in an American courtroom and therefore have no answer."

Forgetting diplomatic protocol, which calls for statements to be translated on the floor into English and French, and not waiting for Zorin, in his capacity as Security Council President to call on him, Mr. Stevenson interrupted the Soviet by loudly demanding that "world public opinion wants an answer right now."

Erupts After Tirade

The incident erupted after Zorin, the Stalinist hatchet-man who engineered the Communist takeover of Czechoslovakia, had delivered a lengthy tirade mocking Mr. Stevenson's charges against the Soviet missile arming of Cuba.

Mr. Stevenson, usually the epitome of courtesy both inside and outside UN council chambers, left startled delegates in the jammed Security Council with their mouths hanging open as he bitterly told Zorin:

"I want to say to you, Mr. Zorin, that I do not have your talent for obfuscation, for distortion, for confusing language and double talk. And I must confess to you that I am glad I do not!"

In a voice filled with fury and sarcasm, the angry American diplomat charged the Soviet Ambassador "with a trespass on credibility that excels your best." Zorin had



VALERIAN ZORIN

"He Who Lied Once Will Not Be Believed . . ."

UPI Photo



ADLAI STEVENSON

"I Do Not Have Your Talent for . . . Double Talk"

AP Photo

said world public opinion had forced Mr. Stevenson to change his position from that stated on Tuesday.

"Well, let me say to you sir, you are wrong again," Mr. Stevenson bitterly declared and reaffirmed the U. S. demand that "those weapons must be taken out of Cuba." His finger pointing at the aging, iron-jawed Russian, Mr. Stevenson continued:

"Next, let me also say to you, sir, that there has been

a change. You—the Soviet Union—has sent these weapons to Cuba. You—the Soviet Union—has upset the balance of power in the world. You—the Soviet Union—has created this new danger—not the United States."

Still seething with fury, his face turning even redder, Mr. Stevenson challenged Zorin not to submit the Council to "another fine flood of rhetorical scorn" as to the truthfulness of the American charges. Turning to face his startled tormentor, Mr. Stevenson shouted:

"All right, sir, let me ask you one simple question: do you, Ambassador Zorin, deny that the USSR has placed and is placing medium and intermediate range missiles and sites in Cuba? Yes or no—don't wait for the translation—yes or no."

Zorin later replied that the Soviets had no need of placing missiles outside of its territory and again ridiculed the photographs Mr. Stevenson had shown the Council of the Soviet sites in Cuba.

Calmed down by now, Mr. Stevenson merely noted that Zorin still had given no direct answer to his question and softly remarked "it remains unanswered; I knew it would."

In the stormy personal clash between the Soviet and American ambassadors—the likes of which the Security Council has never witnessed before—Zorin also exploded and charged Mr. Stevenson with showing faked photographs to the UN during the 1961 abortive invasion of Cuba.

Jabbing his pencil in Mr. Stevenson's direction, Zorin flashed back:

"He who lied once will not be believed a second time."

Accordingly, Mr. Stevenson, your photographs we shall not look at."

Getting in his personal jab at Mr. Stevenson, Zorin said: "This lacks seriousness and I must confess that I had a higher opinion of you personally, sir. Unfortunately, I was in error and I regret this very much."

Not only is it rare for diplomats to resort to personal attacks on each other, but UN diplomats were doubly startled because since his appointment as ambassador, Mr. Stevenson has made it a point to maintain friendly relations with the Soviet delegates even in time of greatest crisis.

From the Beginning

The two-time Democratic presidential candidate had come to the UN with the feeling that a part of the Soviet-American tension there stemmed from the tough personal, as well as political, attitude adopted by Henry Cabot Lodge.

While getting no further politically with Mr. Stevenson, the Soviets had made no secret that they preferred him to Mr. Lodge because he was always "courteous" to them.

However, after sitting for almost two years under Zorin's sarcastic barbs, Mr. Stevenson, showing the strain of round-the-clock work since last Saturday, erupted like a long pent-up volcano and gave the Soviet diplomat the tongue-lashing of his life.

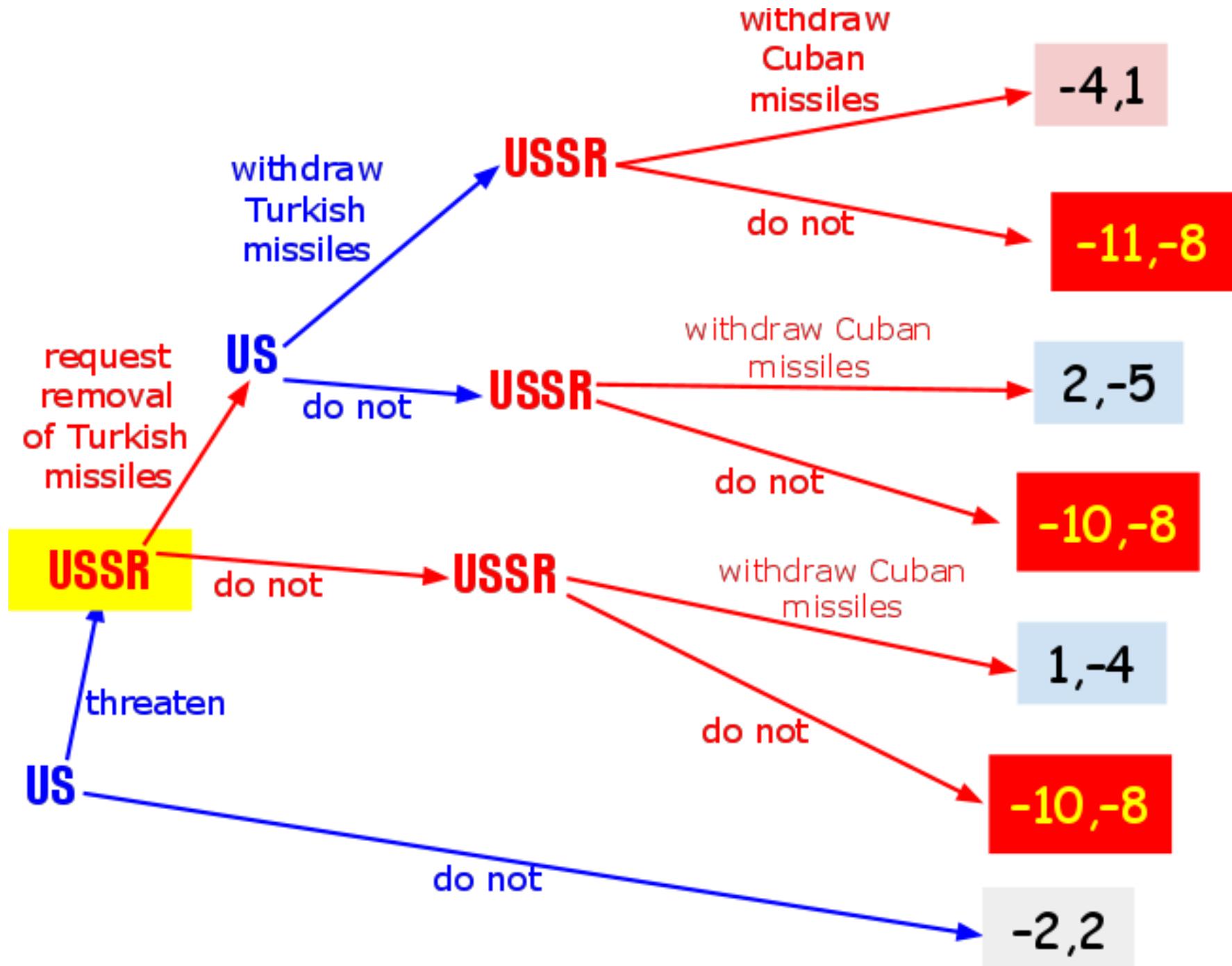
Kennedy
vs
American Hawks

Kennedy
vs
Khrushchev

Khrushchev
vs
Soviet Hawks

Cuba

Turkey





▲ In 1962 US reconnaissance flights detected evidence that the Soviet Union was building nuclear missile bases on Cuba, within range of the US mainland. A US naval

blockade, and a tense period during which nuclear war appeared likely, eventually resulted in the USSR, under Khrushchev, agreeing to dismantle the nuclear bases.

▲ The Cold War was a period of political and economic confrontation between the two superpowers and their allies. The area of highest tension was along the "Iron

Curtain" that divided Western Europe, but the two sides' opposition to each other was played out in conflicts – some of a military nature – all over the world.

Conflicts in which the USA, USSR and allies involved 1947–91:

- 1 Greek Civil War 1947: USA gave aid to help defeat communists
- 2 Berlin Blockade 1948–49: USSR attempted to force France, USA and Britain out of West Berlin by imposing a blockade around the city
- 3 Malayan Emergency 1948–60: UK troops defeated communist insurgents while moving Malaya towards independence
- 4 First Indochinese War 1946–54: French troops tried to prevent independence movement from establishing communism in Vietnam
- 5 Korean War 1950–53 (*map 2*)
- 6 Off-shore Island Crises 1954–55, 1958: US diplomatic effort and military support to Taiwan averted full-scale invasion by China in wake of artillery attack
- 7 Guatemala 1954: USA backed right-wing coup
- 8 Hungary 1956: Uprising of liberal communists crushed by Soviet troops
- 9 Vietnam War 1959–75: US troops directly involved in war 1964–73
- 10 Second Berlin Crisis 1961: East German government erected Berlin Wall and closed all but one of access routes to the city; USA sent tanks to Berlin
- 11 Laotian Crisis 1960–62: Civil war between US-backed and communist-backed forces culminated in establishment of provisional government of unity
- 12 Cuban Missile Crisis 1962 (*map 3*)
- 13 Dominican Republic 1965: USA, fearing communist takeover, sent troops to back government of military junta
- 14 Czechoslovakia 1968: liberal communist government overthrown by troops of USSR and Warsaw Pact allies
- 15 Chile 1973: US-backed right-wing forces overthrew Allende's socialist government
- 16 Angola 1974–90: Civil war between MPLA (backed by Soviet-funded Cuban troops) and the FNLA and Unita (backed by South Africa)
- 17 Namibia 1975–91: Communist-backed forces fought for independence of Namibia, illegally incorporated into South Africa
- 18 Nicaragua 1979: US backing failed to prevent left-wing Sandinistas deposing right-wing regime
- 19 Afghanistan 1979–89: Soviet troops occupied the country to prevent overthrow of pro-Soviet regime

Ποιος «κέρδισε» (εξασφάλισε υψηλότερη ανταμοιβή) με την τελική έκβαση της κρίσης της Κούβας;

