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Keywords: Inclusive teaching, media, music, teaching economics, game theory

JEL Classification: A20, A21

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Wayne Geerling [1] Kristofer Nagy [2] Elaine Rhee [3] Jadrian Wooten [4]

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Economic educators have been teaching with pop culture for decades, but until recently the focus was on English-based media. In this paper, we build on the work of Wooten al. (2021b), who showed how K-pop can be integrated into the principles-level curriculum. We develop three teaching guides that can be used to teach aspects of behavioral economics, game theory and indifference curve analysis – topics which are taught at the end of most principles-level courses but are also standalone upper level courses. The three artists chosen – BTS, BLACKPINK and TWICE – have huge global followings. We hope this paper will contribute to the library of diverse and inclusive teaching resources while helping to address the deficit of resources available to instructors of upper level courses.

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1. Introduction

Over the past twenty years, a number of economic educators have developed resources for other educators to use in their classroom. These resources were most often developed to improve student engagement with the material so that learning the material would become easier. While not specifically mentioned in the majority of the papers, most educators appear to focus on overcoming particular cognitive challenges present in the classroom (Chew and Cerbin, 2021). If students are afraid of the subject, or afraid of failing the subject, they may actually be less motivated to learn. Integrating media into the curriculum shows students that the material can be applied in a variety of ways and understood in a variety of contexts. Media-focused resources have been developed using sources as varied as television shows to Broadway shows (Wooten et al., 2021a). This variety of resources allows an instructor to find a pop culture reference that they believe would be appropriate for their classrooms, and that they themselves are comfortable using.

One of the growing concerns within the economics profession, however, is that the content within most lectures lacks diversity (Bayer and Rouse, 2016; Stevenson and Zlotnik, 2018; Al-Bahrani, 2020). While faculty may find it more comfortable to share examples that they more easily relate to, it may further perpetuate the diversity issue. Based on data collected by Asarta, Chambers, and Harter (2021), at least half of the surveyed instructors never include references to diversity and inclusion issues or references to gender issues in their introductory classroom. This has not been the case for previous surveys of introductory educators, but it's unclear what has caused that drop. In a survey of conference attendees by Goffe and Kauper (2014), the majority of respondents recognized that a purely didactic lecture was ineffective in improving

student learning but this style of information dissemination prevailed because the cost of doing something different was too high. Perhaps the costs associated with integrating discussions centered around diversity are also perceived as too high currently. This paper aims to reduce that burden by outlining a series of diverse teaching guides using the popular Korean music genre: K-Pop.

We develop three teaching guides that can be used in both upper-level and introductory university economics courses. The teaching guides cover topics that are more complex than those covered in previous publications and focus on providing resources for advanced courses to integrate diverse pop culture into their classroom. Instead of relying on traditional English-based media, we identify references in K-pop music videos. In this sense, the paper provides two benefits: a diversification of pop culture resources and resources that can be used in more advanced classes.

2. Literature Review

The use of pop culture in the classroom has had a strong presence in the economics education literature over the past few decades (Wooten et al., 2021a). Most of that work, however, has been targeted at introductory-level content and has referenced English-language media. Focusing on introductory content allows a wider range of faculty to use media in their classroom, but it means that upper-level economics instructors lack an equivalent variety of resources for their courses. Previously, upper-level instructors would need to search through a site like the Economics Media Library (Wooten, 2018) to find clips associated with the topics

they were teaching and then develop the corresponding assessment questions. Researchers have started to fill this void by identifying resources and developing teaching guides that allow educators to teach more advanced concepts in behavioral economics courses (Briguglio et al., 2021) or game theory courses (Geerling et al., 2021a).

While most pop culture resources are based on English-language media, a limited set of resources exist to aid instructors who wish to teach with more diversity (Geerling et al., 2021b; Wooten et al., 2021b; Bose, 2020). As streaming services like Spotify and Netflix become increasingly ubiquitous, students are exposed to a wider variety of pop culture than what they would typically find as part of their traditional free-to-air or cable subscription. These streaming services have broken down the barriers associated with finding and understanding foreign media (Ferreira and Waldfogel, 2013) and have resulted in people consuming genres that are much more similar to each other than in the past (A. Krueger, 2019).

Educators continue to identify a variety of songs that can be used in the classroom. Whether it's music genres like Country music (Melichar, 2018) and Broadway (Rousu, 2016) or entire playlists dedicated to fields like environmental economics (Rousu, Melichar, and Hackenberry, 2021) and macroeconomics (Ben Abdesslem, 2021), great songs can likely be found and used to teach concepts in the classroom. Beyond the engaging nature of songs in general, music can also be used as an effective scaffolding tool by educators who are looking to take some common element among students (e.g., music) to focus on teaching more difficult concepts (Van de Pol et al. 2010; J. Krueger, 2019). This approach can be beneficial for some students so long as the selected song is specific to the economic content being assessed by the instructor (Harter, 2003; McClough and Heinfeldt, 2012; Sickel, 2019). The lesson plans outlined below

purposefully link the economic topic to the song such that students and educators don't have to guess why they're listening to any particular song.

3. An Overview of K-Pop

The Korean Wave (*Hallyu* in Korean) is a collective term used to describe the growth of Korean culture encompassing everything from music, movies, and drama to online games and Korean cuisine.[5] The South Korean government is dedicated to becoming the world's leading exporter of popular culture and K-pop is one of the many "soft powers" used to achieve this aim. While K-pop is a genre of popular music that originated in South Korea, it draws influence from a range of genres like pop, experimental, rock, hip-hop, R&B, electronic, house and dance.[6] The birth of K-pop can be traced to a 1992 performance by Seo Taiji & Boys on a South Korean television talent show, which opened the door to younger generations of artists.[7] Modern "idol culture" began in the mid-1990s and is centred around artists with massive, dedicated fan bases predominantly composed of teenagers and young adults.[8]

K-pop is now a multibillion-dollar global industry. Groups like BTS and BLACKPINK sell out international concerts within minutes, including venues in North America and Europe. In August 2020, BTS was the first all-South Korean group to reach #1 on the US Billboard's Hot 100 Chart[9]

[5] https://martinroll.com/resources/articles/asia/korean-wave-hallyu-the-rise-of-koreas-cultural-economy-pop-culture/
[6] https://www.lafilm.edu/blog/a-brief-history-of-kpop/
[7] https://www.bbc.com/culture/article/20200309-the-soft-power-roots-of-k-pop
[8] https://www.economist.com/asia/2010/01/25/hallyu-yeah
[9] https://www.billboard.com/articles/business/chart-beat/9442836/bts-dynamite-tops-hot-100-chart

and BLACKPINK was the first K-pop group to play Coachella,[10] the largest North American music festival. The contribution BTS makes to the South Korean economy through album and ticket sales, merchandise, and attracting tourists to South Korea is estimated at close to $5 billion per year – about half a percent of the country's annual GDP.[11]

In the latest global music report produced by the International Federation of the Phonographic Industry (IFPI), BTS was named the best-selling artist of 2020 (IFPI 2021, p. 6).[12] The award is calculated according to an artist or group's worldwide sales, downloads, and streams. The South Korean group is the first non-Western act to win the award, and the first whose songs are not predominantly sung in English. According to the same report, South Korea was the fastest-growing major market in the world with year-on-year growth of 44.8% (IFPI 2021, p. 16) and the country was ranked sixth in music markets worldwide (IFPI 2021, p. 11).

The growth of K-pop internationally has been accentuated through the proliferation of digital music, now available through global platforms such as YouTube and Spotify (Kim 2017). Since the late 2000s, K-pop's fan base has extended well beyond Asia thanks to social media platforms such as Facebook, Twitter, and YouTube. Fans from across the globe can now view, download, purchase, or stream music. The major push of K-pop into Western markets began with Psy's parody of South Korean culture in the hit song "Gangnam Style" in 2012. It became the first YouTube video to achieve 1 billion views and in the five years after its release, the original video was viewed more than 3 billion times. Until 2017, it was YouTube's most-viewed

[10] https://www.vulture.com/2019/04/coachella-2019-blackpink-set-was-historic-moment-for-k-pop.html
[11] https://www.npr.org/2021/07/28/1021968141/bts-the-band-that-moves-the-economy
[12] The top five artists were: 1. BTS, 2. Taylor Swift, 3. Drake, 4. Weeknd, 5. Billie Eilish; see "Global Music Report 2021", International Federation of the Phonographic Industry, p. 6. Available to download at https://www.ifpi.org/ifpi-issues-annual-global-music-report-2021/

video.[13] *Hallyu* has been rising for two decades, but K-pop has become increasingly visible to global audiences particularly in the past 10 years. Several K-pop artists, including BLACKPINK and TWICE, now regularly crack the top 10 of the Billboard singles and albums charts, but BTS remains at the apex. In the period since 2017, BTS has had five #1 songs on the US chart, eight top 10 hits, and 22 singles in total be listed on the Billboard Hot 100.[14] "Dynamite", their first song to be sung exclusively in English, debuted at #1 in August 2020 and the band has topped the Billboard 200 main album chart five times.[15] In 2020, BTS was named TIME Magazine's Entertainer of the Year.[16]

The influence of *Hallyu* extends to other aspects of South Korean popular culture, including drama and film. In March 2020, "Parasite" became the first non-English language film to win an Academy Award for Best Picture.[17] In 2021, Netflix's dystopian Korean-language drama "Squid Game" became a global sensation, smashing ratings records, and generating more than $1 billion for the streaming service since its September 17th premiere.[18]

A more comprehensive history of the South Korean music and media industries lies outside the scope of this paper, but this summary has hopefully illustrated the growth of K-pop in recent decades and its transcendental effect on popular culture across the globe.

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[13] https://www.vox.com/culture/2018/2/16/16915672/what-is-kpop-history-explained

[14] In July 2021, BTS made history again when their songs "Butter" and "Permission to Dance" took turns at #1 on Billboard's Hot 100 chart; see https://www.scmp.com/lifestyle/k-pop/artists-celebrities/article/3142861/bts-make-history-again-songs-butter-and

[15] https://www.billboard.com/articles/business/chart-beat/9490955/bts-be-billboard-200-albums-chart-number-one

[16] https://time.com/entertainer-of-the-year-2020-bts/

[17] https://www.oscars.org/oscars/ceremonies/2020

[18] https://www.nydailynews.com/snyde/ny-k-pop-bts-korean-popular-culture-20211101-agwoda3sj5dxhjgbui4ia26ifq-story.html

4. Methodology

The teaching guides have been constructed in a way that allows the instructor to customize them for their audience and context, be it a remote, hybrid, or resident course. The questions accompanying each teaching guide have been designed to allow students to work on their own, in pairs as part of a think-pair-share activity or in small groups. This teaching strategy allows it to be scaled up to large classes (Buckles et al., 2013) or if classes are held remotely through video conference platforms like Zoom (Wooten et al., 2020b).

Each guide has 4-6 questions, ranging in difficulty from easy to intermediate-level, with the questions having the potential to be used as standalone, as a sequence, or covered as a full set, provided the instructor allows up to 30-45 minutes per teaching guide. With minor adjustments, an instructor could adapt the questions to be answered with a classroom response system (e.g., iClicker or Poll Everywhere) or played as an in-class game (e.g., Kahoot! or Quizizz). Wooten et al. (2020a) and Calhoun and Mateer (2013) summarize the benefits of teaching economics with pop culture references using classroom response systems and in-class gaming systems.

The teaching guides themselves can be adapted to a range of different learning situations: (1) assigned as part of an assessment or discussed in class; (2) used to introduce a concept; (3) as a refresher; (4) in a recitation or tutorial; (5) as part of an exam review. We feel they work best as an ungraded, formative assessment following a lesson on a particular topic, but assigned before the subsequent lesson. Students would then be expected to recall concepts from the previous lesson to answer the warm-up activity and assessment questions. This approach is supported

by research that has found practice tests improve performance on final tests (Roediger and Karpicke, 2006; Putnam et al., 2017). By making these assessment activities low/no stakes and eliminating a grade component, it removes any anxiety in providing a wrong answer – which can still promote learning, particularly with follow-up feedback and discussion given (Kornell, Hays and Bjork, 2009).

5. Teaching Guides

Given that microeconomics is fundamentally about human behavior and decision making, its principles can be applied to everyday life. Thus, drawing on pop culture to illustrate concepts taught at the secondary level or in an undergraduate principles-level course is quite straightforward. Finding suitable songs for a paper which focuses on upper-level topics is more challenging. The songs referenced below cover concepts typically taught at the end of a first-year microeconomics course, but which are also taught in more depth at the intermediate level, such as indifference curve analysis, behavioral economics and game theory. The math is intentionally limited in each teaching guide so that students are motivated to learn the intuition behind the concepts before being asked to learn more mathematically rigorous material.

The teaching guides include information about the artists and songs, the economic concepts covered in each music video, a warm-up exercise for the particular topic and a set of questions with suggested answers that reference concepts found in the music video. Each music video includes English captioning as well as commentary on relevant economics principles. The three artists chosen for this paper are BTS, BLACKPINK and TWICE. BTS and BLACKPINK are the two

most popular K-pop groups in-and-outside of Korea, with huge global fanbases, so their inclusion requires no special mention. TWICE became the first girl group in history to hit #1 on the Billboard Top Album Sales chart with an EP (mini album) in July 2021. While not enjoying the same stratospheric level of popularity as BTS and BLACKPINK, TWICE are in that second tier of K-pop artists who are well known and becoming increasingly popular outside of East Asia.

Lesson #1: Budget Constraints and Indifference Curves

Song: More and More (2020)

Artist: TWICE

Length: 4 minutes

Music Video URL: https://music4econ.com/home-1/twice-more-and-more-1

Summary: When a product or service is an economic good, “more is better”. However, in real-life we have a limited amount of money available. To maximize our utility with limited money, we find a combination of goods where the budget constraint and the indifference curve meet.

Concepts: budget constraints, consumer optimization, economic goods, indifference curves, utility, utility maximization.

Key Lyric: “You'll be begging for more. 'Cause you can't get enough. You'll be craving for more. 'Cause it's never enough”.

Warm-Up Activity: Assume you have $100 to spend at the mall later today. What factors determine the things you buy?

Suggested Response: Income and the prices of the goods we wish to purchase comprise the buyer's budget constraint. We assume people want to maximize utility, so people buy a combination of goods that give them the highest level of satisfaction. In economic terms, they attempt to reach their highest indifference curve possible given their budget constraint. Utility maximization is a constrained optimization problem.

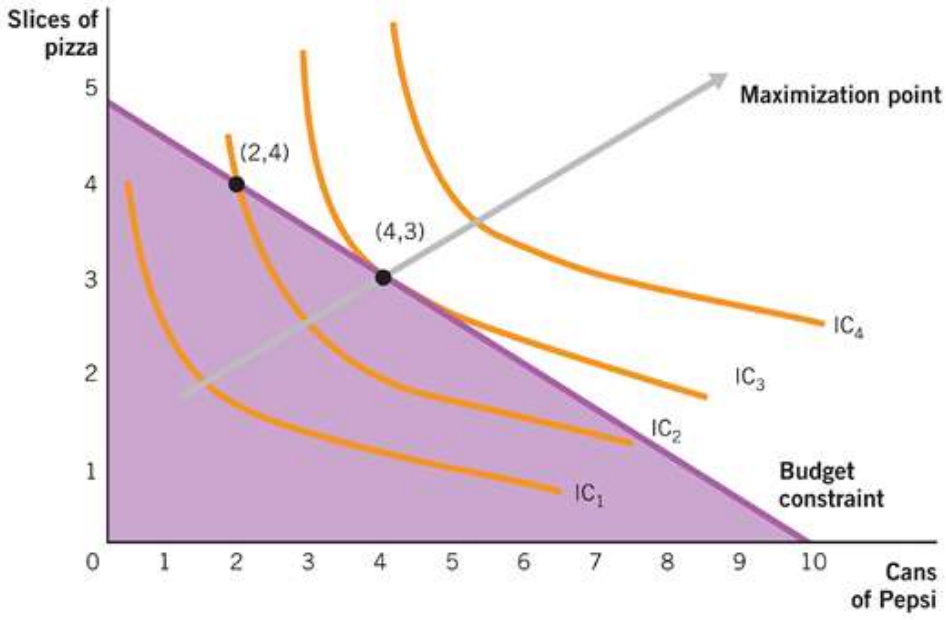
Assessment: Play the clip above and ask students to consider the following questions:

1. *What are the characteristics of items that you might want "more and more" of?*
2. *Assume that pizza and Pepsi are both "goods" you want to purchase. Draw a series of indifference curves which illustrate the maximization point.*
3. *Jeongyeon has to decide how much pizza and Pepsi to consume. She is indifferent between the following combinations:*
    - *Point A: 3 Pepsi cans, 2 pizza slices*
    - *Point B: 3 Pepsi cans, 3 pizza slices*
    - *Point C: 5 Pepsi cans, 2 pizza slices*

    Draw her indifference curve with pizza slices on the vertical axis and cans of Pepsi on the horizontal axis. In what ways has she violated the "more and more" assumption?
4. *Jeongyeon is now given a budget of $10 to buy pizza and Pepsi. Pizza costs $2 per slice and Pepsi costs $1 per can. Illustrate the following combinations on a budget constraint with pizza on the vertical axis and Pepsi on the horizontal axis. What are the affordable bundles?*
    - *0 Pepsi cans, 5 pizza slices*

- *4 Pepsi cans, 3 pizza slices*
- *2 Pepsi cans, 2 pizza slices*
- *10 Pepsi cans, 5 pizza slices*
- *10 Pepsi cans, 0 pizza slices*

5. *Jeongyeon must decide between a combination of 4 cans of Pepsi and 3 slices of pizza (4,3) or 2 cans of Pepsi and 4 slices of pizza (2,4). Use the diagram below to help Jeongyeon discover her optimal consumption level.*[19]

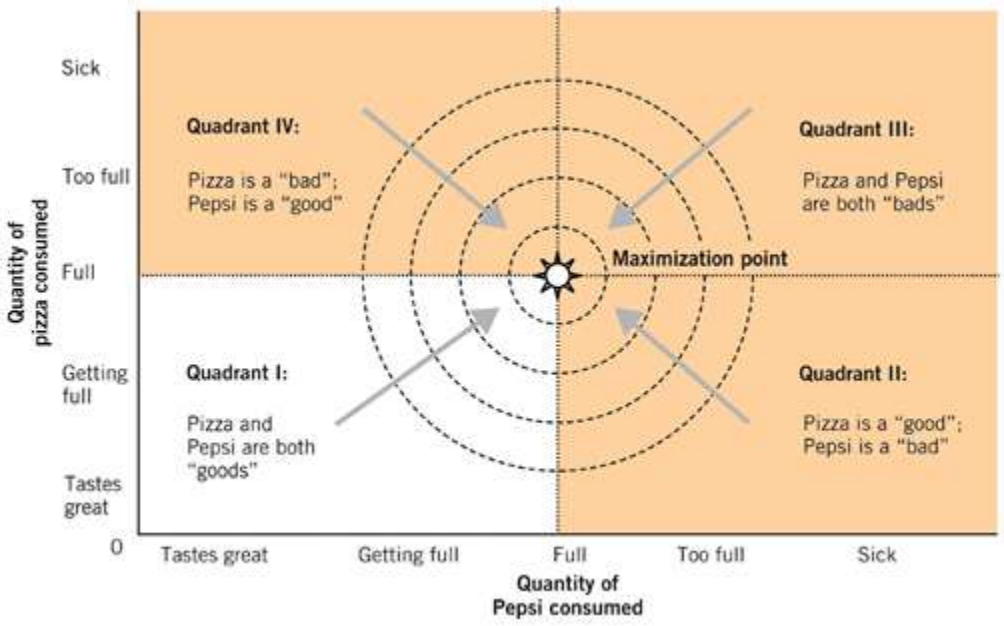


Suggested Answers:

1. These items are known as economic goods. Total utility increases as people consume more, which means the marginal utility is positive.

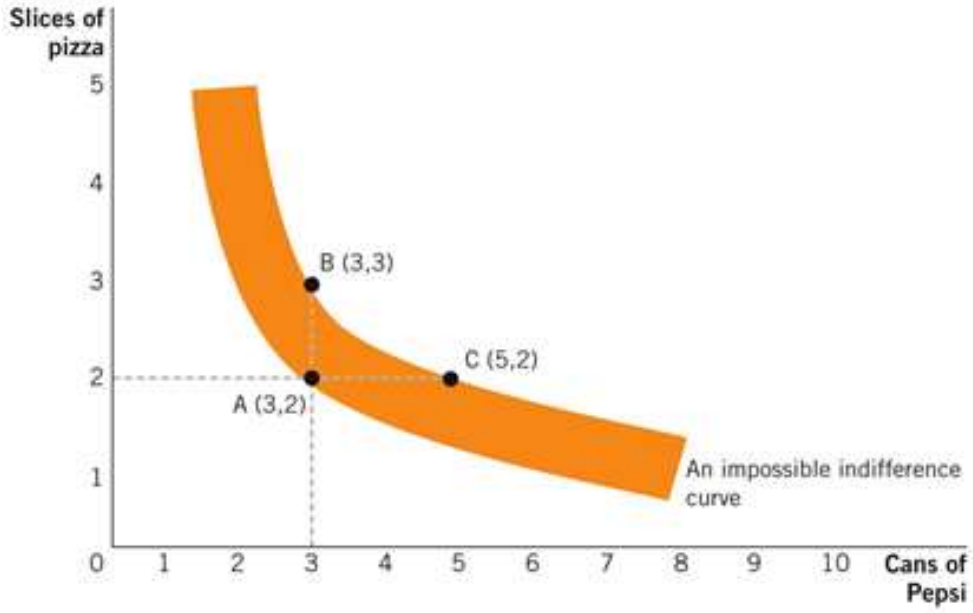
[19] Diagram came from Dirk Mateer and Lee Coppock, *Principles of Microeconomics* 3e (W.W. Norton: New York, 2021), p. 538.

2. Quadrant I is the relevant region for our analysis. Consuming more pizza and Pepsi leads to higher utility. Marginal utility is positive. In the other quadrants (II, III and IV), at least one of the items is reducing the consumer's utility.[20]



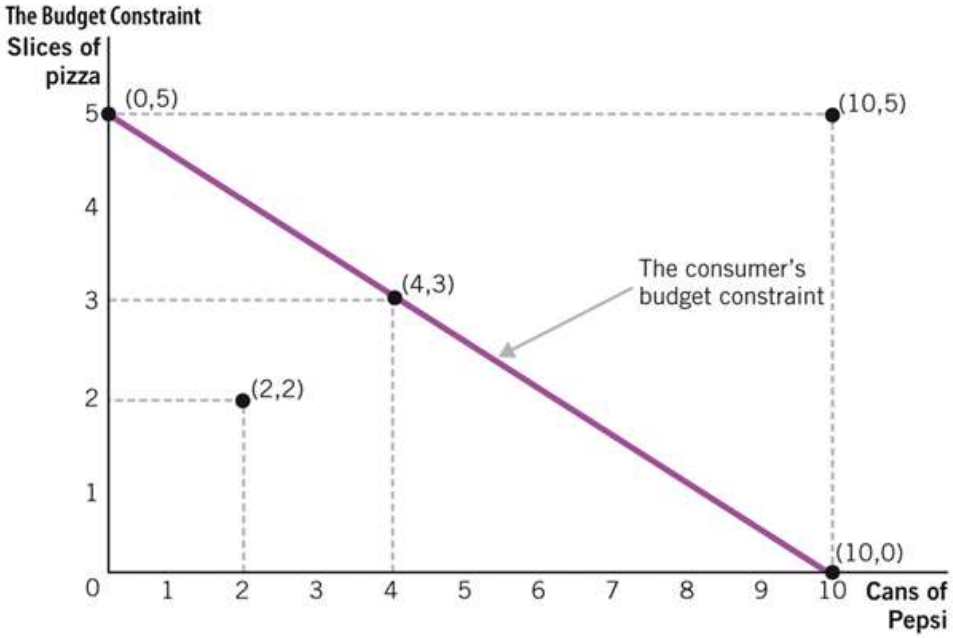
3. Indifference curves represent the various combinations of two goods that yield the same level of utility. By definition, points A, B and C should be equally preferable. However, point B has 1 more slice of pizza than point A. Point C has 3 more cans of Pepsi than point A. Therefore, under the "more and more" assumption, points B and C should be strictly preferred to point A, which contradicts what we see in the thick indifference curve below.[21]

[20] Ibid, p. 531.
[21] Ibid, p. 535.



4. The following bundles are affordable because they lie on the budget constraint: (0,5), (4,3), (2,2) and (10,0). **Note**: (2,2) is affordable, but lies inside the budget constraint, as Jeongyeon is only spending $6. She can afford to buy more Pepsi and pizza with the remaining $4, which will increase her total utility. (10,5) is unaffordable. With the prices given, she would need $20 to buy this combination, but only has $10.[22]

[22] Ibid, p. 532.



5. Jeongyeon maximizes her utility by consuming 4 cans of Pepsi and 3 slices of pizza. Both (2,4) and (4,3) are on the budget constraint, so both combinations are affordable. The combination (4,3) lies on a higher indifference curve (IC3) than (2,4), so that combination must make her happier because of the "more and more" assumption. At (4,3) the slope of the budget constraint is equal to the slope of the indifference curve. What she must give up is equal to what she is willing to give up.

Lesson #2: Ultimatum Game

Song: How You Like That? (2020)

Artist: BLACKPINK

Length: 3 minutes 3 seconds

Music Video URL: https://music4econ.com/home-1/blackpink-how-you-like-that

Summary: The Nash Equilibrium of an ultimatum game is that proposers should offer $.01 to the receivers and keep the rest for themselves. Assuming receivers are income maximizers, the receivers should accept this offer. In lab experiments, this is not the typical outcome: proposers usually offer more money to the receivers than the theory would predict and receivers reject offers that they feel are unfair, even though that means they earn nothing.

Concepts: backward induction, behavioral economics, fairness, Nash equilibrium, rational choice, ultimatum games.

Key Lyric: "Your girl needs it all and that's a hundred…I want what's mine."

Warm-Up Activity: Play the ultimatum game with your students for 5-10 minutes.[23]

1. Put students into pairs.
2. Each pair gets $1,000 in participation points to divide.[24]
3. Player 1 writes down an amount they are willing to offer their partner. If Player 2 accepts their offer, they both earn the points. If Player 2 rejects their offer, neither player gets anything.
4. To ensure friends don't play with each other, students can be randomly partnered by drawing names from a bowl.

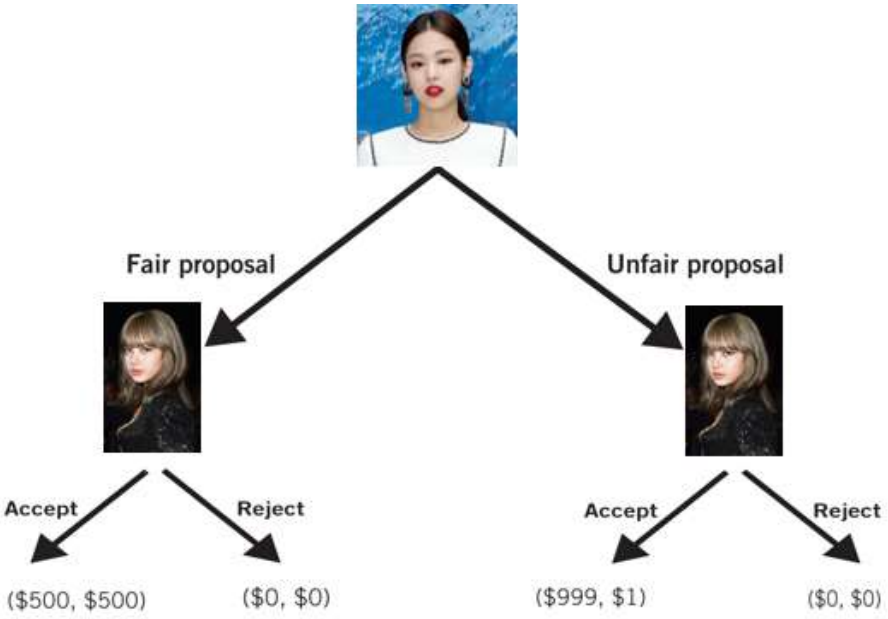
[23] When this experiment has been run in the authors' classes, students typically reject unfair offers even though they hurt themselves by receiving $0 instead of $1 (or any other low-ball offer). Player 2 does this to protest the unfairness of Player 1.

[24] Instructors could use bonus points, or base it on a dollar, if they are worried that students won't take this seriously. A bag of candy could also work provided the candy was easily divisible, e.g. in small packets.

5. Demonstrate the sequential nature of the game by noting that Player 1 "moves first" because they must determine the initial offer and that Player 2 can decide to accept or reject their offer after the decision is made by Player 1.

Assessment: Play the clip above and ask students to consider the following questions:

Jennie and Lisa from BLACKPINK are deciding how to split $1,000 in an ultimatum game. Jennie can make an offer to Lisa, who can either accept or reject it. If Lisa accepts, they will split the money according to Jennie's offer (see the decision tree below). If Lisa rejects the offer, neither of them get any money.



1. *What is the Nash Equilibrium in this game assuming we use the standard rational choice model? Use backward induction and the decision tree above to explain your answer.*
2. *BLINK (BLACKPINK's fan club) has a reputation for making decisions based on "fairness" alone. If members of this group played the ultimatum game among themselves, what*

results would we expect to see? Assume that Player 1 suggests how to allocate $1,000 and Player 2 decides to reject or accept.

3. *Traditional economic theory suggests that when two traders each expect gains from a trade, they will reach an agreement, no matter how unequal those gains may be. Frans de Waal, a primatologist, replicated the ultimatum game with Capuchin Monkeys. Watch his TED Talk "Moral Behaviour in Animals" (de Waal 2011), in particular the scene from 12:12-16:33). What happens when two monkeys are paid unequally? Is an unfair proposal accepted or rejected?*
4. Jennie is majoring in economics and has just read experimental results on the ultimatum game from Gueth et al. (1982) which shows that, on average, proposers would offer between 30% and 40% of the endowed amount and that this split is almost always accepted by researchers. When the proposal falls to less than 20% of the endowment, the rejection rate exceeds 50%. If Jennie thinks Lisa would behave as an average receiver, how much would she offer Lisa in an ultimatum game with $1,000 to split?

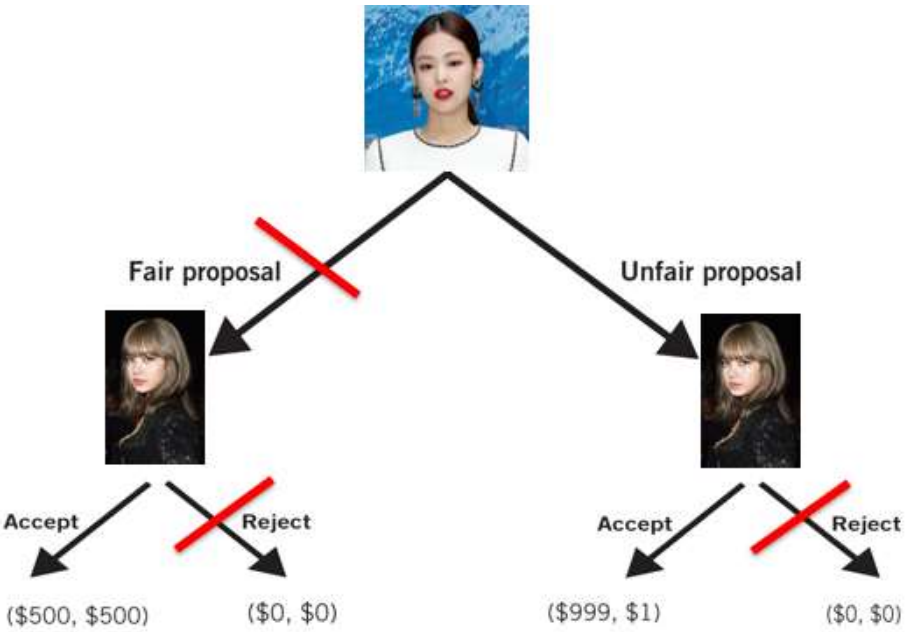
Suggested Answers:

1. The Nash Equilibrium is (Unfair Proposal, Accept). Jennie receives $999, Lisa receives $1. This is a sequential game; therefore, we can use backward induction to find the Nash equilibrium. First, we find the subgames and then from the very bottom subgame to the very top, we figure out what a player would do for each subgame given the information from the subgame below.

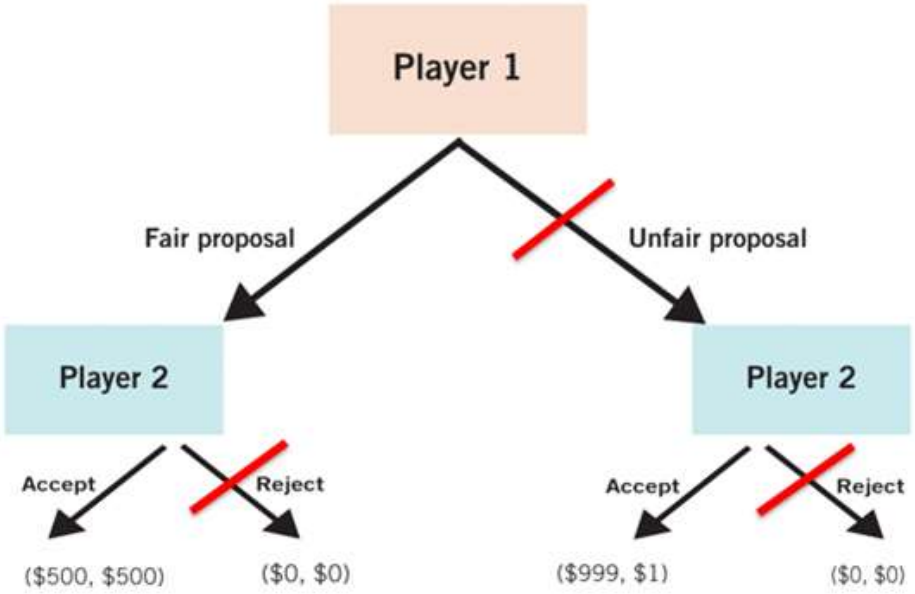
In this game, there are 3 subgames. In the **bottom left subgame**, Lisa is the player who chooses an action. If Lisa chooses to accept Jennie's proposal she receives $500. If Lisa chooses to reject Jennie's proposal she receives $0. Since $500 > $0, Lisa chooses to accept.

In the **bottom right subgame**, Lisa is the player who chooses an action. If Lisa chooses to accept Jennie's proposal she receives $1, whereas if she rejects she receives $0. Since $1 > $0, Lisa chooses to accept.

In the very **top subgame**, Jennie is the player who takes an action. If Jennie chooses to make a fair proposal, she will receive $500. If Jennie chooses to make an unfair proposal, she will receive $999. Since $999 > $500, Jennie chooses to make an unfair proposal.



2. If members of BLINK cared more about fairness, the most common outcome would be the proposers making a fair proposal to split the $1,000 with the receivers equally, which the receivers would accept. Therefore, they would each get $500.



3. Capuchin Monkeys show their displeasure if given a smaller reward than a partner receives for performing a similar task. The monkey which receives cucumber as a reward becomes highly agitated when it discovers that its companion is receiving grapes instead. The conclusion de Waal draws from this study is that monkeys share many behavioral traits we associate with humans: fairness, reciprocity, empathy and cooperation. An unfair proposal is rejected!
4. Jennie will offer Lisa $200 because she knows that an average receiver accepts offers >= 20% and rejects offers < 20%.

Lesson #3: Game Theory

Song: Seesaw (2018)

Artist: BTS

Length: 4 minutes 5 seconds

Music Video URL: https://music4econ.com/home-1/bts-seesaw

Summary: The Battle of the Sexes game has two Nash Equilibria where each player prefers a different Nash Equilibrium. In experiments, to reach both Nash Equilibriums equally (alternate Nash Equilibrium), the two players must coordinate. However, since each player tries to reach their preferred Nash Equilibrium, coordination is not easy. Communication, signaling and sequencing moves can be a solution to this problem.

Concepts: Battle of the Sexes game, coordination, game theory, Nash equilibrium, Nash equilibria, sequential, signaling, strategies.

Key Lyric: "Let's not drag it on and do as we please. Let's now make the decision whether to get off or not. A repetitive seesaw game. Now, stop."

Warm-Up Activity: Break your students into pairs, then pose the following scenario.

There is a K-pop loving couple who have to decide which concert to attend that night. One person wants to see BTS while the other wants to see BLACKPINK. Unfortunately, the two concerts are on at the same time and both of their cellphones are dead. Both of them are worse off when they go to a concert separately compared to when they go to a concert together. In

other words, they would rather go to a concert together even though it is a concert they do not like than go to different concerts separately. How can we solve this problem?

Ask students to list their responses on a notecard and then share their solutions with the class.

Suggested Response: There is no unique, correct answer here, but some popular answers are:

1. The couple decides to take turns.
2. One of them sacrifices for the other.
3. Follow the one who has a stronger payoff from the concert they want to attend.
4. Take the initiative and make the other partner come with you.
5. Don't go to both concerts and find another activity to do together.

This hypothetical scenario is an example of a two-player coordination game that also involves elements of conflict.

Assessment: Play the clip above and ask students to consider the following questions:

Jimin and RM from BTS need to decide which songs the group will perform at the upcoming MTV Music Awards. Jimin is the row player and RM is the column player in the payoff matrix below. Each of them has two BTS songs they want to sing. Use this payoff matrix to answer the questions that follow.

	RM		
Jimin		**Dynamite**	**Permission to Dance**
	Dynamite	**2**, **1**	**0**, **0**
	Permission to Dance	**0**, **0**	**1**, **2**

1. *What are the two Nash Equilibria in the game above?*
2. *Does each player have a particular Nash Equilibrium that they prefer more than the other?*
3. *Let's say we did an experiment where 2 players played this game 10 times with each other. What patterns do you think we would detect?*
4. *Some patterns are not ideal, but what are some possible solutions?*

Suggested Answers:

1. The two Nash Equilibria are: (Dynamite, Dynamite) and (Permission to Dance, Permission to Dance).

   Step 1: Let's assume we are Jimin. When RM chooses Dynamite, we have 2 strategies: Dynamite and Permission to Dance. When RM chooses Dynamite, if we choose Dynamite, our payoff is 2, and if we choose Permission to Dance our payoff is 0. Since 2 > 0, when RM chooses Dynamite we want to choose Dynamite too.

   When RM chooses Permission to Dance, if we choose Dynamite our payoff is 0, and if we choose Permission to Dance, our payoff is 1. Since 1 > 0, when RM chooses Permission to Dance, we also want to choose Permission to Dance.

   Step 2: Let's assume we are RM. When Jimin chooses Dynamite, we have 2 strategies: Dynamite and Permission to Dance. When Jimin chooses Dynamite, if we choose

Dynamite, our payoff is 1, and if we choose Permission to Dance our payoff is 0. Since 1 > 0, when Jimin chooses Dynamite we want to choose Dynamite too.

When Jimin chooses Permission to Dance and if we choose Dynamite our payoff is 0, and if we choose Permission to Dance, our payoff is 2. Since 2 > 0, when Jimin chooses Permission to Dance, we also want to choose Permission to Dance.

Step 3: Combining the results from above we have two Nash Equilibria: (Dynamite, Dynamite) and (Permission to Dance, Permission to Dance).

2. The two Nash Equilibria are (Dynamite, Dynamite) and (Permission to Dance and Permission to Dance).

   Jimin's payoff from (Dynamite, Dynamite) is 2 and his payoff from (Permission to Dance, Permission to Dance) is 1. Since 2 > 1, Jimin likes the (Dynamite, Dynamite) Nash Equilibrium better than the (Permission to Dance, Permission to Dance) equilibrium.

   RM's payoff from (Dynamite, Dynamite) is 1 and his payoff from (Permission to Dance, Permission to Dance) is 2. Since 2 > 1, RM likes the (Permission to Dance, Permission to Dance) Nash Equilibrium better than the (Dynamite, Dynamite) Nash Equilibrium.

3. Here are the four most common experimental results:
   - One person gets their preferred equilibrium consistently.
   - The two players alternate equilibria (take turns like a seesaw!)
   - They play different strategies with frequencies close to the mixed strategy Nash equilibrium.

- They keep playing (Dynamite, Permission to Dance) and get zero payoff. Each player keeps choosing the strategy that represents the Nash equilibrium that they prefer.

4. There are many creative solutions which match with the solutions to the warm-up activity. Two solutions we can take from experimental economics are: (1) communication and (2) make it a sequential game.

   Communication stimulates pattern 2 (the seesaw pattern!) Good communication allows the worst-case scenario (both earning 0 payoff) and a fair outcome.

   Making it a sequential game stimulates pattern 1. The first player to go chooses the strategy that represents the Nash Equilibrium they want and the second player chooses the same strategy to avoid 0 payoff.

6. Conclusion

This paper builds on the work of previous educators who have contributed to the creation of diverse teaching resources using pop culture. Whereas previous publications typically focused on mapping concepts to principles-level courses, this paper is the first to introduce three teaching guides that can be used in *both* upper-level and principles-level economics courses. We hope that, over time, diverse and inclusive media will become standard in all introductory economics course and that the use of pop culture will become more common in upper level courses as a way to engage students, as a refresher, or a lead-in to the more abstract concepts.

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