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## KING OF THE MULTI-DOMAIN BATTLEFIELD

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**JCSP 43 DL**

***Exercise Solo Flight***

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## **KING OF THE MULTI-DOMAIN BATTLEFIELD**

Don't forget your great guns, which are the most respectable arguments of the rights of kings.  
— Frederick the Great of Prussia

### INTRODUCTION

It appears on many photographs and pictures and may be attributed to a Rudyard Kipling poem, many soldiers in the heat of battle have uttered the words, “The Guns! Thanks God the Guns.” Whether it be the early beginnings of gunpowder artillery as a direct fire system or from a time when the artillery began its indirect role, the success of numerous operations have depended on the effectiveness of the artillery. After all, one of the mottos of the artillery, *ubique*, means everywhere. That is to say, the artillery is involved everywhere to ensure victory.

Gunpowder artillery has transformed dramatically over the years and continues to develop new capabilities. In its infancy, the artillery was mainly used for breaching fortifications.<sup>1</sup> With technological advancements in the guns themselves, such as becoming lighter, more maneuverable, and with greater accuracy at longer range, they have been able to shape and influence the outcome of many battles. While tactics on the battlefield developed to counter the devastating effects of the artillery, the protection of the guns became as important as how they were used.<sup>2</sup> It was soon realized that the artillery on the battlefield must be deployed with care to take advantage of its awesome tactical effects.

The true weapon of the artillery, the projectile, has gone through many significant developments as well. From a solid iron ball, to high explosive, to Shrapnel, to air burst, to

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1. Andrew Knighton, "12 Key Moments in the History of Artillery," WAR HISTORY ONLINE, December 09, 2017, accessed May 15, 2018, <https://www.warhistoryonline.com/guns/12-key-moments-history.html>.  
2. Ibid.

rockets, to GPS guided munitions, the hot steel rain of the artillery has caused demoralising and psychological effects. Whether it be through massed artillery fire or with one precision round, the role of the artillery within the modern day battlespace continues to bring confidence to the commanders on the ground.<sup>3</sup> A precious resource advising those commanders are the forward observation officers (FOO). Not only does the FOO coordinate and adjust fires in support of manoeuvre forces, they are sensors. At a time when surveillance and target acquisition (STA) is becoming a more significant resource, FOOs are capable of filling the role.<sup>4</sup>

With other resources ability to provide manoeuvre forces with fire support such as close air support (CAS) and attack helicopters (AH), the artillery has been undervalued. In this paper it will be demonstrated that the artillery will be relevant in the multi-domain battlefield of the future through these three factors: firepower; intelligence, surveillance, target acquisition, and reconnaissance (ISTAR); and the analysis of 21<sup>st</sup> century operations.

## FIREPOWER

Firepower refers to the capacity as a military unit to deliver effective fire on a target.<sup>5</sup> Over the years, the profession of the artillery has improved by revising and improving on its equipment and doctrine. In doing so, the effectiveness of firepower has increased in range, precision, and cost-effectiveness. The artillery uses both lethal and non-lethal fire effectively to achieve the desired effect. Originally focussing on tube artillery, the artillery now offers High-Mobility Artillery Rocket System (HIMARS), Artillery Tactical Missile System (ATACMS),

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3. Andrew Knighton, "12 Key Moments in the History of Artillery," WAR HISTORY ONLINE, December 9, 2017, accessed May 15, 2018, <https://www.warhistoryonline.com/guns/12-key-moments-history.html>.

4. Ibid.

5. "Firepower," Merriam-Webster, accessed May 2, 2018, <https://www.merriam-webster.com/dictionary/firepower>.

and Precision Guidance Kit-Modernization (PGK-M) to the battlefield, which will be explained to show its relevance in today's as well as future battles.

When artillery first came to be king of the battlefield it started with tube artillery. Tube artillery refers to howitzers and mortars. Traditionally the most responsive fire support on the battlefield, tube artillery provides not only devastating physiological effects but devastating psychological effects as well. This was seen in January 2009 when British forces established a firebase on top of a rocky plateau after carrying on foot a L118 105mm light gun in order to provide support to a major cordon-and-search operation in the region. With the gun overlooking the plains and threatening the Taliban, the Taliban dubbed it 'the dragon'. It was observed soon after that the Taliban adopted a much more defensive posture in their fight against the British soldiers.<sup>6</sup>

One of the most effective howitzers used today is the M777 lightweight 155 mm towed howitzer. It is lighter and smaller than others of the same calibre yet more powerful than any gun of its kind.<sup>7</sup> It is highly mobile and easily transportable by aircraft, helicopter, or truck. "The M777 provides close and deep fire support without sacrificing range, stability, accuracy, or durability."<sup>8</sup> It has, for standard munitions, a maximum firing range of thirty kilometres which can be extended with long-range or GPS munitions.

Considering circular error probability (CEP), half of all conventional unguided 155 mm artillery projectiles can be expected to land within two hundred and sixty-seven metres of their

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6. Elie Tenenbaum, "The Battle over Fire Support. The CAS Challenge and the Future of the Artillery", Focus strategique, No. 35 bis, October 2012.

7. National Defence and Canadian Army, "M777 Howitzer," 1 Canadian Ranger Patrol Group | Canadian Army, December 14, 2017, accessed May 15, 2018, <http://www.army-armee.forces.gc.ca/en/weapons/m777-howitzer.page>.

8. Ibid.

intended target.<sup>9</sup> This has made unguided artillery dangerous to use in close combat for fear of friendly fire and collateral damage. A solution to this problem is the Precision Guidance Kit-Modernization (PGK-M). The PGK-M transforms conventional artillery shells into precision munitions with GPS anti-jamming guidance capabilities for today's evolving battlespace.<sup>10</sup> PGK-M technology is designed to ensure every artillery round is delivered with complete precision so that every fire mission is conducted accurately. Being produced at a lower cost than the previously used Excalibur round, the PGK-M is highly accurate, and its lethal capability enables one-shot hits on the target.<sup>11</sup> With PGK-M, the proportionality of effects is now able to be seen. It requires less ammunition than conventional artillery to complete the mission, saving on costs, increasing effectiveness, and reducing the potential of collateral damage. With the reduction of collateral damage, there is a potential to reduce the negative impact of the attitudes and public opinions of civilian populations.

In addition to the lethal effects that the artillery provides with its howitzers, coordinating and delivering non-lethal effects is another example of how the artillery is effective and relevant in their firepower. Fire support refers to the collective and coordinated use of indirect fire weapons which can include lethal and non-lethal means in support of a fire mission. The artillery can contribute to the battle by using non-lethal means, such as illumination and smoke munitions. Smoke munitions can be used as an aid in deceiving the enemy, concealing maneuver, and increasing potential force ratios.<sup>12</sup> Illumination rounds, containing magnesium

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9. "XM1156 Precision Guidance Kit Heads to Afghanistan," Defense Media Network, accessed May 2, 2018, <https://www.defensemedianetwork.com/stories/xml1156-155mm-precision-guidance-kit-heads-to-afghanistan/>.

10. "Precision Guidance Kit-Modernization (PGK-M)," BAE Systems | International, accessed May 2, 2018, <https://www.baesystems.com/en/product/precision-guidance-kit-modernization>.

11. Ibid.

12. John Pike, "FM 3-50: Smoke Operations - Chptr 5 Other Tactical Operations," Vietnam War - American Return to Dog Fighting, accessed May 5, 2018, <https://www.globalsecurity.org/military/library/policy/army/fm/3-50/Ch5.htm>.

flares suspended by parachutes, illuminate the battlefield at night or used during the day to mark targets for other resources such as close air support to be able to engage.

The high-mobility artillery rocket system (HIMARS) is the newest member of the multiple-launch rocket system (MLRS) family of weapons. It is a highly-mobile artillery rocket system offering the fire power of MLRS on a wheeled chassis and is operated by a crew of three. Its purpose is to engage and defeat artillery, air defence concentrations, trucks, light armour and personnel carriers, as well as support troops and concentrations.<sup>13</sup> One of the most desirable aspects of this weapons system is its ability to launch its weapons and move away at a high speed before enemy forces locate the launch site.<sup>14</sup>

The HIMARS launcher can aim at a target in just sixteen seconds. The extended-range missile can engage targets at more than seventy kilometres.<sup>15</sup> Not only does HIMARS have the ability to engage targets at this range, but it also has the ability to engage targets with superior precision and accuracy and at a range of three hundred kilometres using the Artillery Tactical Missile System (ATACMS). ATACMS is a long-range, guided missile that gives commanders the immediate firepower to shape the battle space and win the deep battle.<sup>16</sup> It is designed with Global Positioning System (GPS) for precision accuracy. "The M57 variant was used successfully in Operation Iraqi Freedom and Operation Enduring Freedom, where deep strike capability was required against high-payoff targets."<sup>17</sup> This will be relevant in the multi-

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13. "HIMARS High-Mobility Artillery Rocket System," Army Technology, accessed May 2, 2018, <https://www.army-technology.com/projects/himars/>.

14. Ibid.

15. Ibid.

16. John Pike, "MGM-164A ATACMS QRU / ATACMS 2000," Vietnam War - American Return to Dog Fighting, accessed May 2, 2018, <https://www.globalsecurity.org/military/systems/munitions/atacms-2000.htm>.

17. John Pike, "MGM-164A ATACMS QRU / ATACMS 2000," Vietnam War - American Return to Dog Fighting, accessed May 2, 2018, <https://www.globalsecurity.org/military/systems/munitions/atacms-2000.htm>.

domain battlespace as it delivers a single, five-hundred pound high-explosive warhead to its target using GPS, and engages point to target with minimal collateral damage.<sup>18</sup>

It has been suggested that close air support (CAS) is taking the place of artillery. This claim can be disputed for several reasons. Due to the high readiness of the artillery, a battery is ready to fire in two minutes which is the same amount of time it is required to get a pilot from the ready room to their aircraft.<sup>19</sup> Also, the artillery is not affected by adverse weather conditions, such as poor visibility or thunderstorms, which is a consideration when using air resources. A final factor to consider is cost efficiency. “The cost of a fighter bomber, its ammunition, and related pilot and FAC training cannot compete with the cost of operating an artillery gun and the related training.”<sup>20</sup>

The firepower of the artillery can bring awesome effects with minimal coordination in the multi-domain battlefield and in a timely manner. This gives manoeuvre commanders flexibility in their planning, and confidence to know that the soldiers on the battlefield are well supported throughout an operation.

## INTELLIGENCE, SURVEILLANCE, TARGET ACQUISITION, AND RECONNAISSANCE (ISTAR)

Intelligence, surveillance, target acquisition, and reconnaissance (ISTAR) is a key military capability that generates and delivers specific information and intelligence to decision makers at all levels in support of the planning and conduct of operations. It can be characterized

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18. Ibid.

19. "How Is Close Air Support Changing?" Joint Air Power Competence Centre, April 08, 2015, accessed May 20, 2018, <https://www.japcc.org/how-is-close-air-support-changing/>.

20. Ibid.

as the co-ordinated direction, collection, processing and dissemination of timely, accurate, relevant and reliable information and intelligence.<sup>21</sup> ISTAR involves a continuous process that is well suited to the artillery. ISTAR is critically important for planning and conducting operations as the information and more importantly, analysis, provide the commander and staff a better frame in which to make informed decisions on how to best affect the adversary. ISTAR aims to find possible gaps in the adversary's defenses while exploring the possibilities of creating gaps for friendly forces.

One key sensor that the artillery has is the expertise of the forward observer officer (FOO). Although recon and armoured personnel are often trained to call in fire missions, they do not have the same level of training and knowledge of resources that an artillery FOO has. As an advisor to the supported arm commander, FOOs are specialists that fire plan and coordinate multiple fire support resources, which includes both lethal and non-lethal effects. This will be of particular importance in the future multi-domain battlespace as the number of effects to be coordinated such as electronic warfare (EW), information operations, or public affairs, to name a few, will need to be understood and executed in a coordinated manner. The role of a FOO is a discipline that requires a constant commitment to professional development, continual learning, and self-reflection on thinking and practices. "Throughout military history, the field artillery has become known as the 'king of battle', and nothing displays the king's power more than the forward observer."<sup>22</sup>

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21. Committee Office and House of Commons, "House of Commons - Defence - Thirteenth Report," House of Commons - Transport, Local Government and the Regions - Appendices to the Minutes of Evidence, accessed May 10, 2018, <https://publications.parliament.uk/pa/cm200708/cmselect/cmdfence/535/53505.htm>

22. "A Forward Observer's Role on the Battlefield," DoDlive, accessed May 20, 2018, <http://www.dodlive.mil/2013/06/26/a-forward-observers-role-on-the-battlefield/>.

As part of the deep battle and future operations, FOOs establish observation posts as directed by their battery commander in order to relay information to the fire support coordination centre (FSCC) on potential targets and future gun positions. Targeting from top down, FOOs provide additional information to confirm details of the target or to gain more information for use in the targeting boards.

Using unmanned aerial vehicles (UAVs) and drones, the vision of the forward observer goes far beyond that of yesteryear. UAVs no longer only provide ISR capabilities; rather, they have been used in the adjustment of artillery onto fixed targets.<sup>23</sup> This practice allows friendly forces to reach out to bring effects onto targets at greater distances while remaining at a relatively safe distance themselves. In future operations, it is predicted that effects will be brought to bear with drones that jam enemy radars and locate anti-aircraft batteries while the artillery destroys them with long-range missiles, rockets, and cannon shells.<sup>24</sup>

Additionally, FOOs investigate hostile indirect fire support resources including such things as crater analysis<sup>25</sup> and contributing information related to battle damage assessment (BDA). This could include effects that were lethal or non-lethal at the tactical, operational, or strategic level.

The contribution that the artillery makes with ISTAR started during WWI with General McNaughton. The infantry soldiers would see fewer casualties due to the use of flash spotting and sounding ranging which enabled the artillery to engage in effective counter battery

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23. "A Brief History of Drones," Imperial War Museums, accessed May 20, 2018, <https://www.iwm.org.uk/history/a-brief-history-of-drones>.

24. J. Freedberg Jr., "Artillery, Drones, Missiles Will Help FVL Penetrate Air Defenses: FVL CFT," Breaking Defense, April 01, 2018, accessed May 20, 2018, <https://breakingdefense.com/2018/03/artillery-drones-missiles-will-help-fvl-penetrate-air-defenses-fvl-cft/>.

25. "Low-tech Methods Give Useful Intel on Enemy Fire," Wwww.army.mil, , accessed May 20, 2018, [https://www.army.mil/article/54889/low\\_tech\\_methods\\_give\\_useful\\_intel\\_on\\_enemy\\_fire](https://www.army.mil/article/54889/low_tech_methods_give_useful_intel_on_enemy_fire).

operations.<sup>26</sup> This early beginning to surveillance and target acquisition (STA) led to current capabilities such as the hostile artillery locating system (HALO). HALO “uses specially developed advanced acoustic data processing techniques to determine the location of artillery and mortars with exceptional accuracy, reliability and speed.”<sup>27</sup> HALO can detect gun breaks and impacts from artillery, mortars, and tanks as well as other explosions such as mines, bombs, and improvised explosive devices (IEDs).<sup>28</sup> This passive and covert system provides 360-degree coverage to monitor activities over a very large area reaching out to a radius of twenty-five kilometres.<sup>29</sup> “The British Army has been successfully using HALO for many years. It has been deployed in both the urban areas and mountainous terrain of Bosnia and Kosovo, and operated in the deserts and cities of Iraq and Afghanistan.”<sup>30</sup> Able to deploy in cities and other complex terrains, HALO is suited to force protection operations as well. Deploying HALO in this manner allows for a coherent picture of activity over a large area that can provide the commander with displays that show trends, allows for pattern analysis, and interdiction task planning.<sup>31</sup>

The ISTAR capabilities of the artillery provide commanders a better operating picture and target information. It is a capability that will also keep the artillery relevant in the multi-domain battlespace of the future.

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26. "Generals - A.G.L McNaughton | Canada and the First World War," WarMuseum.ca - Democracy at War - Dieppe Raid, 19 August 1942 - Operations, , accessed May 20, 2018, <https://www.warmuseum.ca/firstworldwar/history/people/generals/a-g-l-mcnaughton/>.

27. Selex ES, *HALO Hostile Artillery Locating System* (Essex, UK: Sigma House, 2014).

28. Ibid.

29. Ibid.

30. Ibid.

31. Ibid.

## TWENTY-FIRST CENTURY OPERATIONS

The first example of twenty-first century operations that demonstrate the artillery's relevance is the Canadian contribution to the international effort to combat terrorism and to help stabilize Afghanistan. This operation included the artillery during Canada's combat mission which ending in 2011. During this time, it was determined through combat operations in which Canadian soldiers were engaged in Afghanistan, that there was a pressing need for accurate fire support. The Canadian army struck a deal in its acquisition of thirty-seven M777 light-weight 155mm towed howitzers from the United Kingdom's BAE Systems.<sup>32</sup> This procurement showed the Canadian government's commitment to the relevance of the artillery in the 21<sup>st</sup> century. "Both the U.S. and Canada operated M777s in Afghanistan providing fire support to coalition forces. Its ability to be airlifted to remote positions by helicopter gives the system enormous operational flexibility makes it ideal for a challenging environment like Afghanistan."<sup>33</sup>

A second example of current operations is the Royal Canadian Artillery's current deployment in Latvia to improve the capacity of indirect fire support as part of Op REASSURANCE. Since 2014, Canada has actively participated alongside NATO Allies in measures to maintain security and stability in Central and Eastern Europe through partnering, training, exercises, and other operational tasks.<sup>34</sup> Latvia is a clear demonstration of Allied solidarity and NATO's resolve in upholding its collective defence commitment.<sup>35</sup> The artillery is relevant as they are contributing to battlegroup exercises as it can be seen that the artillery would

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32. Paul Pryce, "On Target: The Procurement of Canadian Artillery," NAOC, accessed May 20, 2018, <http://natoassociation.ca/on-target-the-procurement-of-canadian-artillery/>.

33. "\$118 Million in New Orders for BAE Systems' M777," Raytheon to Divest a Majority Stake in Its Aviation Support Business to Veritas Capital, accessed May 21, 2018, [http://www.defense-aerospace.com/article-view/release/105619/bae-wins-\\$118m-orders-for-m777-howitzer.html](http://www.defense-aerospace.com/article-view/release/105619/bae-wins-$118m-orders-for-m777-howitzer.html).

34. National Defence, "Canadian-led NATO Multinational Battlegroup in Latvia Proves Its Capability and Interoperability," Canada.ca, August 25, 2017, accessed May 20, 2018, [https://www.canada.ca/en/department-national-defence/news/2017/08/canadian-led\\_natomultinationalbattlegroupinlatviaprovesitscapabi.html](https://www.canada.ca/en/department-national-defence/news/2017/08/canadian-led_natomultinationalbattlegroupinlatviaprovesitscapabi.html).

35. Ibid.

play a role in any potential future conflict. The howitzers support the military exercises of U.S. Army Europe, the Canadian-led enhanced Forward Presence Battlegroup in Latvia, and other NATO Allies as opportunities arise.<sup>36</sup>

A final example of current operations that demonstrate the artillery's relevance is Operation IMPACT: The Canadian Armed Forces' (CAF) support to the Global Coalition against Daesh in Iraq and Syria. The coalition is in support of the Iraq army and other forces; the primary support that the coalition provides is fire support. There are close support batteries that are in direct support of manoeuvre forces in which the coalition have a FOO forward to coordinate that direct support. As part of this operation, Canada supports the coalition with highly-skilled CAF members.<sup>37</sup> According to Lieutenant Colonel Eric J.G. Groulx, who is an artillery officer by trade and was the Chief of Lethal Fires for XVIII Airborne Corps in 2017, there is a role for the artillery in the future battlespace:

In future operations, precise artillery will be vital in the close fight as one cannot always depend upon their resources due to weather or other priorities. Artillery also acts as the lead to coordinate fires at the higher level for the deep fight. This requires senior artillery staff to be trained in targeting, Collateral Damage Assessment, and capabilities of the airstrike. HIMARS and other long range precision artillery resources are key to long-term success for gunners.<sup>38</sup>

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36. David Pugliese, "Canadian M777 Howitzers to Remain in Latvia – Artillery Gunners to Come Home at End of October," Ottawa Citizen, August 28, 2017, , accessed May 22, 2018, <http://ottawacitizen.com/news/national/defence-watch/canadian-m777-howitzers-to-remain-in-latvia-artillery-gunners-to-come-home-at-end-of-october>.

37. National Defence, "Operation IMPACT," DND CAF, May 23, 2018, accessed May 21, 2018, <http://www.forces.gc.ca/en/operations-abroad-current/op-impact.page>.

38. Eric JG Groulx, "Artillery Relevance in the 21st Century-LCol EJG Groulx," interview, May 18, 2018.

One reason that the artillery will be considered relevant in the future is due to the lack of appetite for friendly casualties.<sup>39</sup> “We can expect to see coalitions continuing to provide fire support to whatever side we support in the battle. That support makes the difference in the balance of power in the fight so that whoever we support will win.”<sup>40</sup>

These are but three 21<sup>st</sup> century operations that effectively demonstrate the relevance of the artillery. Throughout the world, the artillery continues to show its relevance in a variety of environments.

## CONCLUSION

Throughout the history of the artillery, it can be seen that continued improvements to the projectile, delivery platform, and tactics have kept the artillery at the leading edge of capabilities. By way of intelligence, surveillance, target acquisition, and reconnaissance combined with the expertise of the forward observer to advise the supported arm commander in indirect fire support, the artillery can be a difference maker on the multi-domain battlefield. With the ability to operate in many different weather conditions, target acquisition resources are deployed with confidence knowing that effects can be brought to bear with a high degree of accuracy. Bringing the roar of the guns to life in either massed artillery fire or selectively with one tactically placed round, the firepower of the artillery is responsive and precise. The ability to have precision and range makes the artillery indispensable on the future battlefield. Delivering suppressive or interdiction fire with reliable accuracy on time and on target can shake the very ground. Often just demonstrating the potential lethal effects can cause the adversary to adjust their tactics. The

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39. Ibid.

40. Ibid.

psychological potential of the artillery is a weapon onto itself. The adversary, knowing that the artillery has the ability to place a round on a target and not knowing when it could happen, would certainly have cause and valid reason to be fearful.

Gone are the days of the artillery being considered as a 'low tech' weapon. Continual improvements in the technology has taken a dumb bomb and made it smart. With these precision munitions, there is now an ability to exercise proportionality of effects with greater reliability. This limits the amount of unnecessary destruction or collateral damage and, thus, reduces the negative opinions an operation may receive. As well, including the non-lethal abilities of the artillery gives supported arm commanders additional options especially in sensitive areas.

Analysing current operations that the artillery is a part of shows its continued relevance. The capabilities and ultimately the effects that the artillery continues to provide commanders on the battlefield, whether through firepower or ISTAR, is indispensable. As the artillery has done throughout its history, it remains focussed on improvement of systems and professional development so that the proper effect can be delivered to the supported arm on time and on target.

As demonstrated through the three factors of firepower; intelligence, surveillance, target acquisition, and reconnaissance (ISTAR); and the analysis of 21<sup>st</sup> century operations, the artillery is relevant in the multi-domain battlefield of the future. Though each element of a coalition has a role to play, no one goes anywhere in an operation without fire support, and it is responsiveness of the artillery that stands out. No other can match the expertise or ability to produce desired effects. After all, as Frederick the Great of Prussia said, "Artillery adds dignity, to what would otherwise be a vulgar brawl."

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