

Fighting in the fog of war

**Decision-making under extreme uncertainty
in the Waterloo campaign**

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Uncertainty in military operations, and countermeasures.

- **Where are the enemy forces? What are their strengths and weaknesses?**
 - Reconnaissance and intelligence.
- **What are their commanders' intentions?**
 - Understanding of enemy ethos and doctrine.
- **Where are friendly forces, where are they going?**
 - Clear communication between detached forces.
 - Training and briefing of subordinates.
- **Such uncertainties, which equally affect naval operations, can be illuminated by a study of the 1815 Waterloo campaign.**



Military operations in the age of Napoleon

- In that period an army was composed of infantry, cavalry, artillery and various supporting arms.
- An army corps was an all-arms force of c. 25000.
- Communications relied on mounted couriers, and on the clarity of orders which they carried.
- Movement of a large force depended on the road conditions, and was prone to confusion and delay.
- Once armies began to move, a general could locate confidently only the troops which he could see.
 - Information on other friendly or enemy troops was frequently mistaken or out of date.

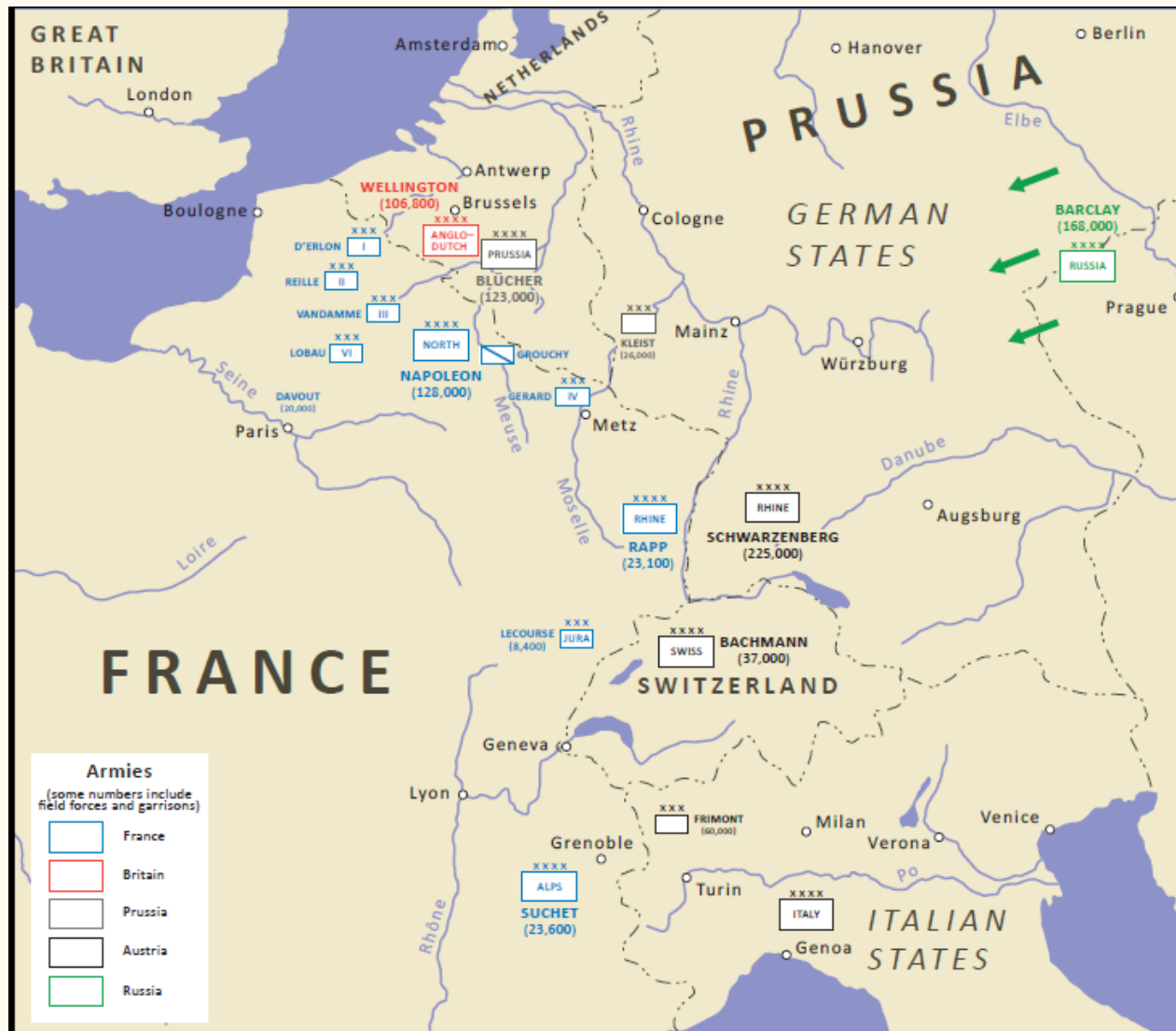


Prior to the Waterloo campaign

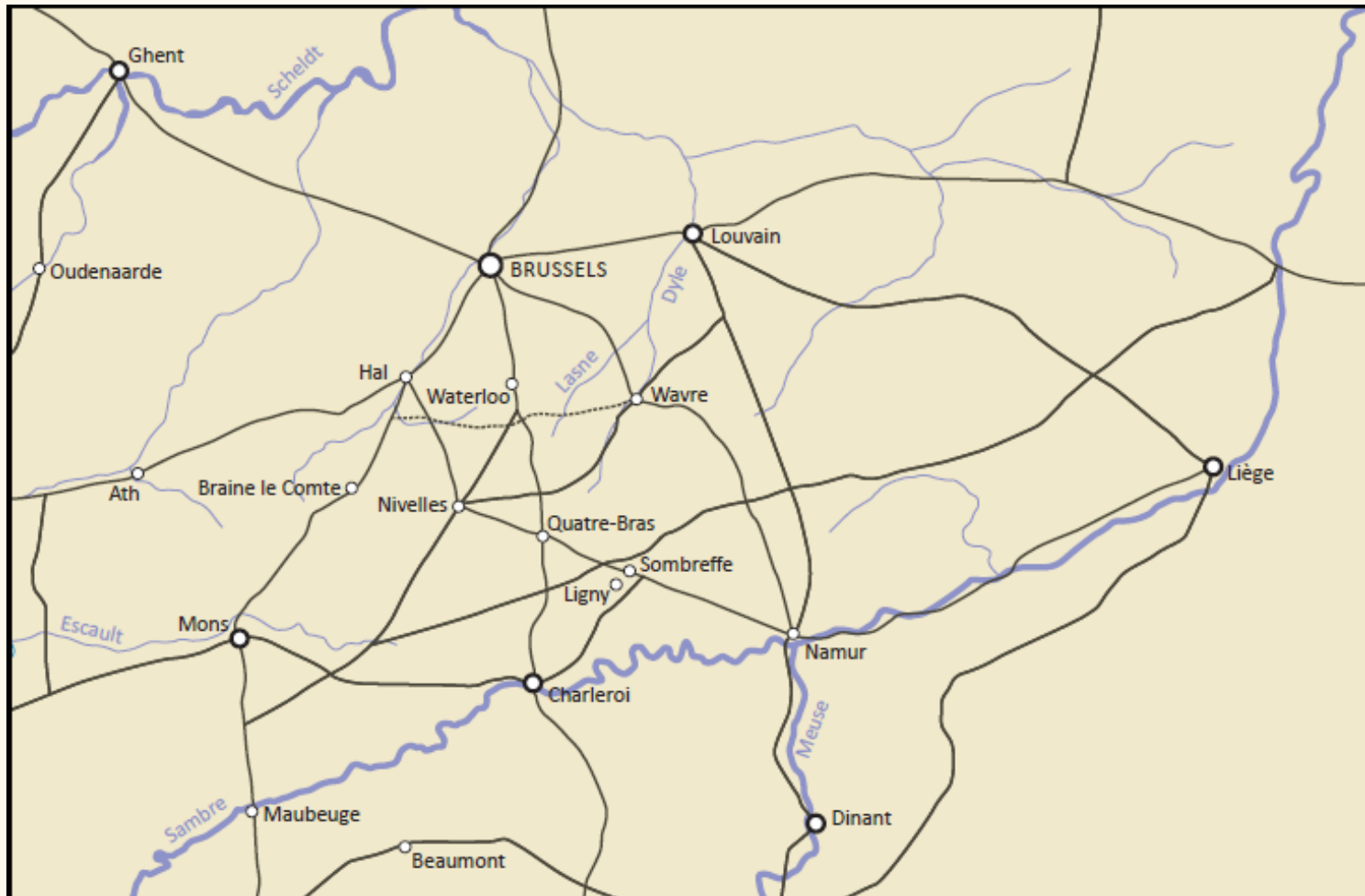
- **In 1793-1814 Britain fought a long war with France.**
 - Intermittent support from various Continental nations.
- **May 1814 - Defeated Napoleon was exiled to Elba.**
- **March 1815 - Napoleon seized power in France.**
 - Britain, Austria, Prussia and Russia declared him an outlaw, and pledged 150,000 troops each to restore order in France.
- **Two Allied armies assembled in Belgium, and others were on the march through Germany.**
- **Napoleon assembled an army in north-east France.**



Europe, early June 1815



Principal roads in southern Belgium



Problems of the rival commanders

■ Wellington

- His army was heterogeneous, polyglot and inexperienced.
- Britain was not at war with France

■ Blucher

- Prussian plans to annex much of Saxony had alienated troops
- Westphalian troops might be unenthusiastic

■ Wellington & Blucher

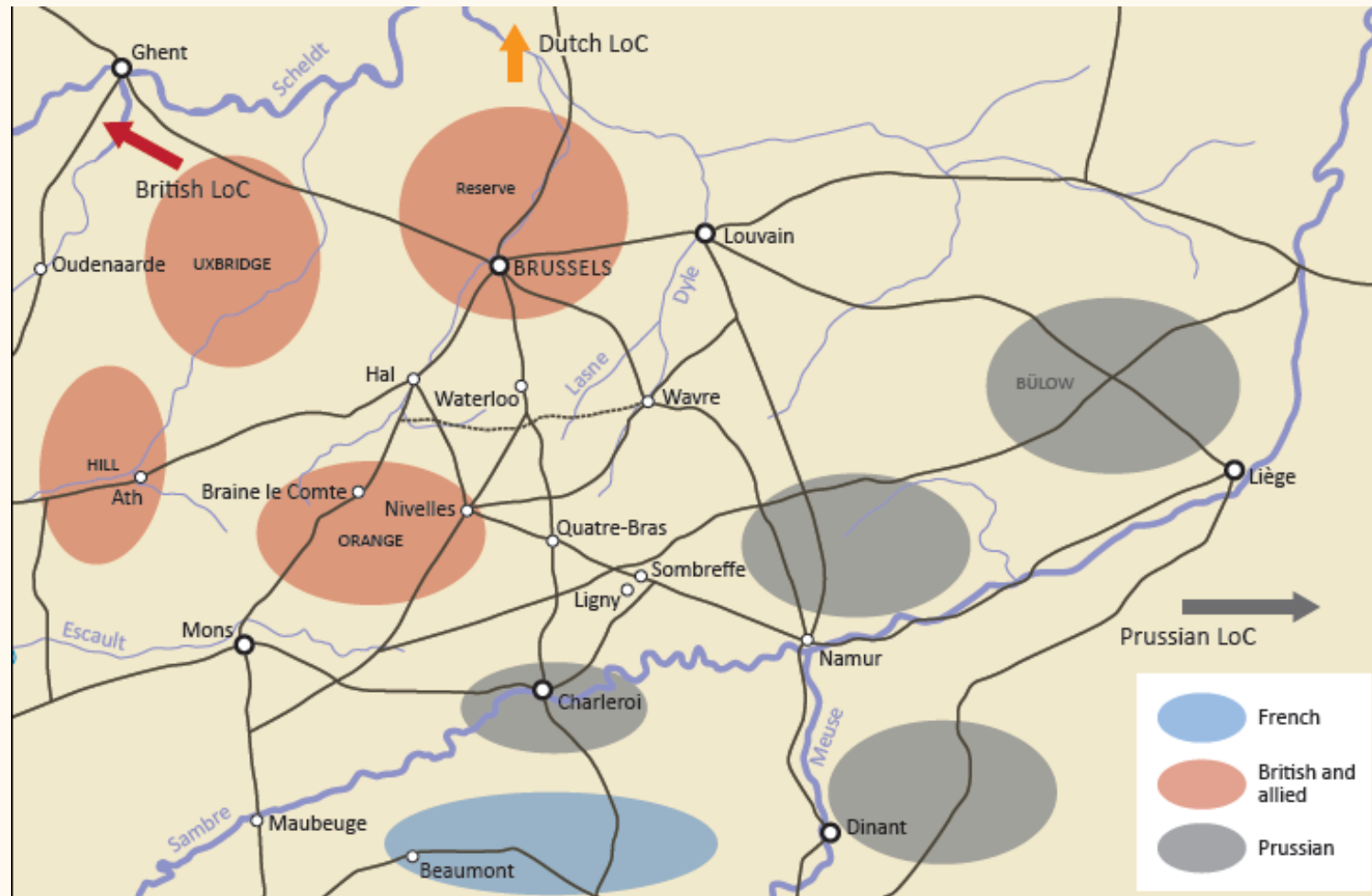
- Would Napoleon attack, and if so where?

■ Napoleon

- Fragile public support in France.
- Mistrust between officers who were royalist and imperialist.
- Only 3 of 18 surviving Marshals served in Army of the North.



Bivouac areas of rival armies



Napoleon's plan of attack

- Napoleon planned to launch a sudden offensive at the junction of the Allied armies, to force them apart, to defeat them separately if possible, and to win prestige and resources by the capture of Brussels.
- He faced adverse odds of 7:4, but he knew that the Allied armies might be clumsy and fragile.



Allies' responses to intelligence

- The glow of French campfires on the 13/14th June, and information from French deserters on the 14th, convinced Gneisenau that an attack was imminent.
- He ordered the dispersed Prussian corps to assemble, and to concentrate near Ligny.
- Wellington was unconvinced by rumours, and had received nothing from his trusted chief of intelligence. His forces stayed in their bivouacs.

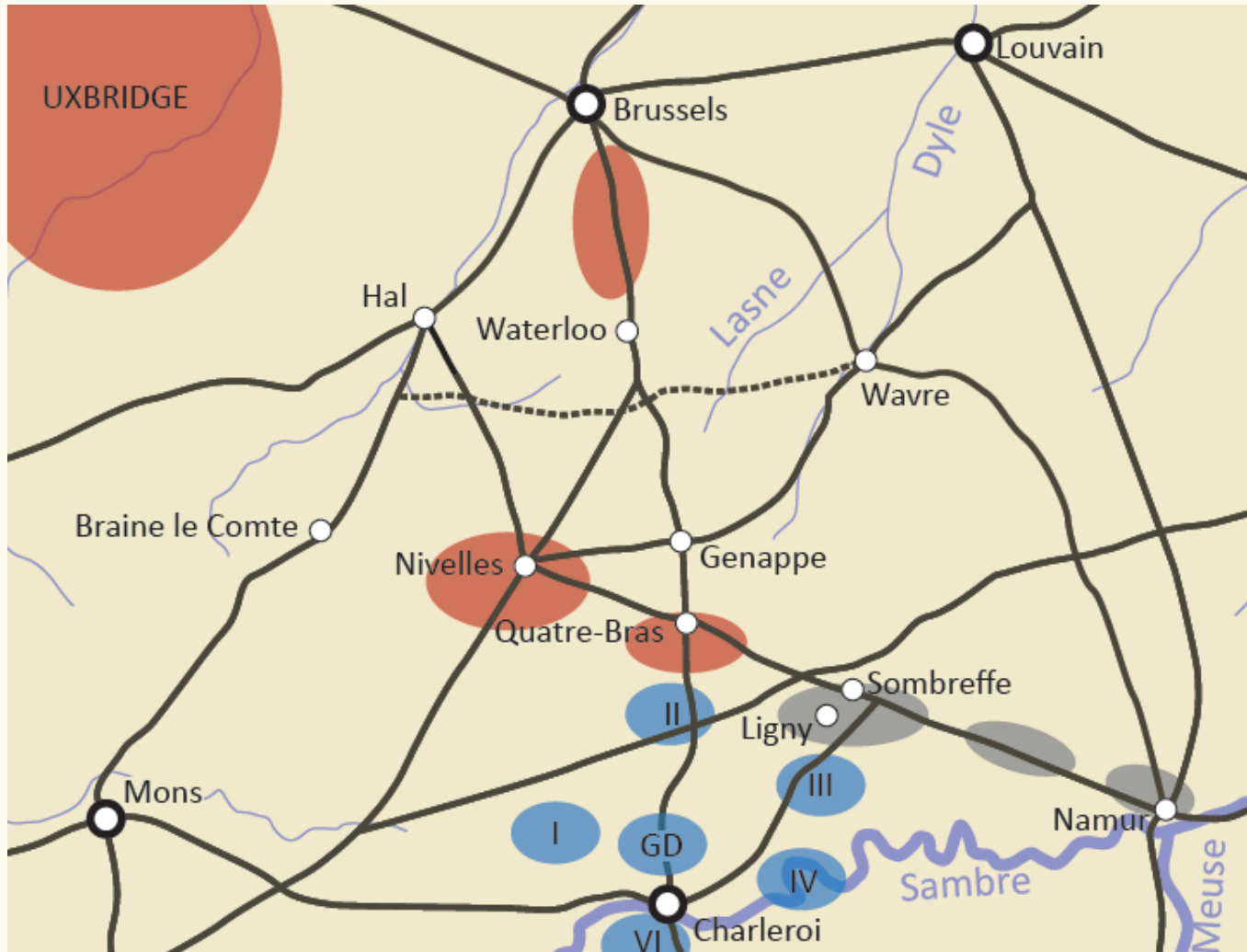


Events of the first day, 15th June

- **The French offensive suffered some delays.**
 - Poor roads, Prussian resistance, undelivered order, desertion.
- **In the afternoon Napoleon reorganized his army into two wings and a reserve.**
 - Ney – charismatic, but newly-joined. Grouchy – newly promoted Marshal, no experience of independent command.
 - All orders would in future be sent via wing commanders.
- **Bulow's Prussian corps dallied.**
- **1900h - Wellington ordered his forces to concentrate at their divisional HQs.**
 - Well-placed to join Prussians OR oppose advance via Mons.
 - Perponcher disobeyed, and placed a brigade at Quatre Bras.
- **2359h Wellington ordered his forces to Quatre Bras.**



Actual positions, 0830 16th June



Wellington's view, 0830 16th June



Napoleon's view, 0830 16th June



Napoleon's options for the second day, 16th June

- **Napoleon could guess that the Allied armies had an agreed strategy, which might be either -**
 - (1) To retreat behind rearguards along their divergent lines of communication, or
 - (2) to concentrate forward – a riskier option.
- **(1) Napoleon could send two corps towards Quatre Bras and another two plus the Guard against the apparently-larger rearguard at Ligny.**
- **(2) Napoleon could concentrate most of his army against Ligny, leaving one French corps to hold Wellington in check.**



Events of the second day, 16th June

- **Napoleon issued orders at 0830, not overnight.**
- **He adopted option 1 but (disastrously) changed his mind in mid-afternoon. Two French corps did not fight that day.**
- **Drawn battle at Quatre Bras.**
 - Up to 34,000 allies lost 4,800
 - Up to 22,500 French lost 4,100
- **French victory at Ligny.**
 - 64,900 French lost 11,000 plus 2000 detached
 - 83,000 Prussians lost 16,000 plus 9,000 deserters
- **In both battles the average effectiveness of the French forces exceeded that of the Allies.**



Choices under uncertainty

- In some games of chance, the probabilities and the potential gains and losses are known; gamblers making successive choices can be guided by the principle of expected values.
- In some lotteries the gamblers know the chance of winning, but do not know the potential gain.
- In fixed-odds betting at horse races, the gamblers know the potential gain and loss, but do not know the actual probability that a horse will win.
- In the real world, the probabilities of alternative outcomes are often unknown, but the gains and losses can generally be estimated.



Payoff and regret tables

- A payoff table shows the gain or loss arising from a particular scenario and a chosen option.
- A decision maker can adopt the maximin principle.
 - Identify the smallest gain for each option, and
 - Select the option yielding the largest of these values.
- Alternatively a decision maker can construct a **regret table** and use the principle of **minimax regret**.
 - Identify the best result in each scenario,
 - Calculate the regret arising from other options,
 - Identify the largest regret for each option, and
 - Select the option yielding the smallest of these values.

Case study: BSE (mad cow disease)

	Low infection	Medium infection	High infection	Maximum regret
No action	-10 0	-50 15	-100 50	50
Mild action, Costs 10 Penalty down 50%	-15 5	-35 0	-60 10	10
Strong action, Cost 40 Penalty down 90%	-41 31	-45 10	-50 0	31

Napoleon's payoff and **regret** tables for 16th June

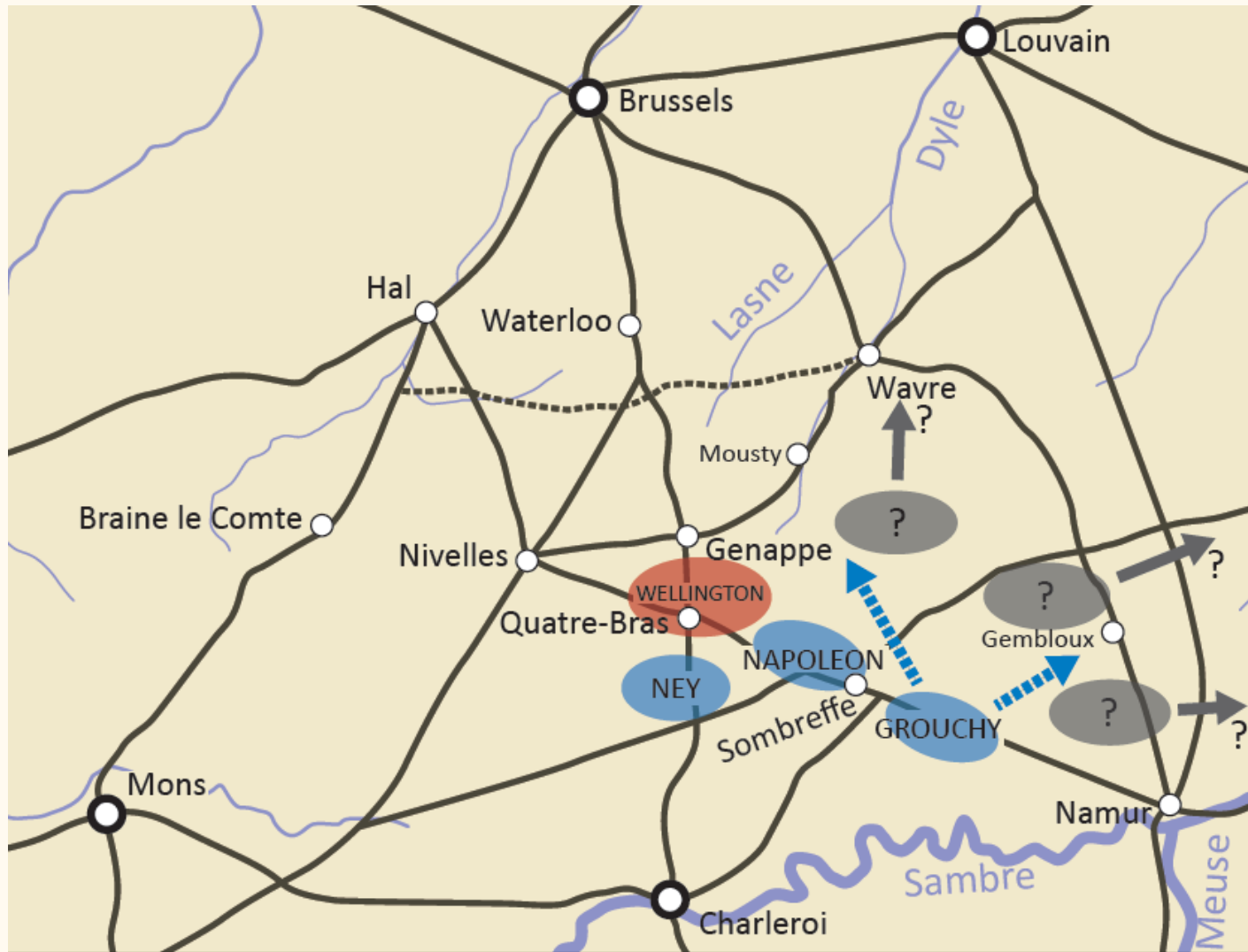
	Allies retreating	Allies concentrating forward	Maximum regret
Two corps to Quatre Bras, Three corps to Ligny, One corps at Charleroi	Two minor French victories 2 0	Hard-fought French victory at Ligny. Another at QB 5 5	5
One corps to Quatre Bras, Five to Ligny	Minor French victory at Ligny. Wellington retires 1 1	Decisive French victory at Ligny. Drawn battle at QB 10 0	1

Napoleon's options for the third day, 17th June

- Napoleon did not know the direction of the Prussians' retreat. He could choose to -
- 1) pursue the Prussians, leaving Ney with two corps to contain Wellington, or
- 2) concentrate most of his army to defeat and/or pursue Wellington, and send Grouchy with two corps to pursue the Prussians north-eastwards, or
- 3) concentrate almost all of his army to defeat and/or pursue Wellington, and send Grouchy with one corps to march north on the west bank of the Dyle (thereby screening Napoleon's eastern flank).



Alternative missions for Grouchy



Events of the third day, 17th June

- **French cavalry found some Prussians fleeing east.**
- **0730h - Wellington heard the result of Ligny, and began to withdraw from Quatre Bras to Waterloo.**
- **1100h – Napoleon chose option (2) and marched on Quatre Bras, sending Grouchy with two corps to Gembloux.**
 - Pursuit of Wellington was foiled by torrential rain.
- **Blucher rallied and resupplied his army at Wavre.**
 - He promised Wellington support of two corps next day.
- **Napoleon found Wellington deployed for battle at Waterloo, but did not summon Grouchy.**

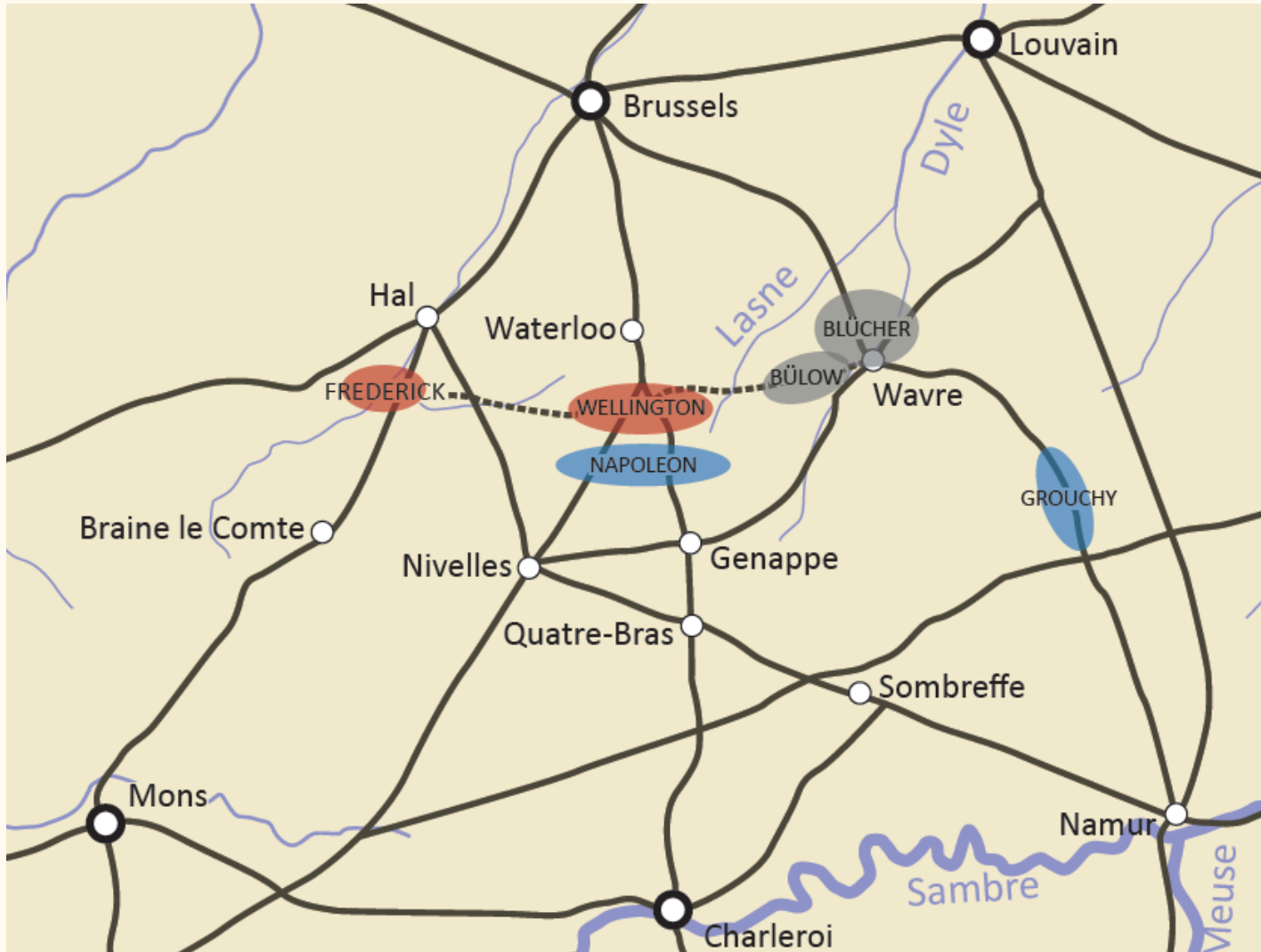


Napoleon's payoff and **regret** tables for 17th June

	Prussians in full retreat, Wellington retreats	Prussians resilient, Wellington fights with promise of support	Maximum regret
Strong French force to pursue Prussians	Both allied rearguards harassed, capture of Brussels. 10 0	Victory over Prussian rearguard at Wavre Decisive defeat at Waterloo 0 5	5
Small French force to advance on west bank of Dyle	Wellington's retreat harassed, capture of Brussels. 9 1	Prussians delayed, Hard-fought victory at Waterloo, capture of Brussels 5 0	1



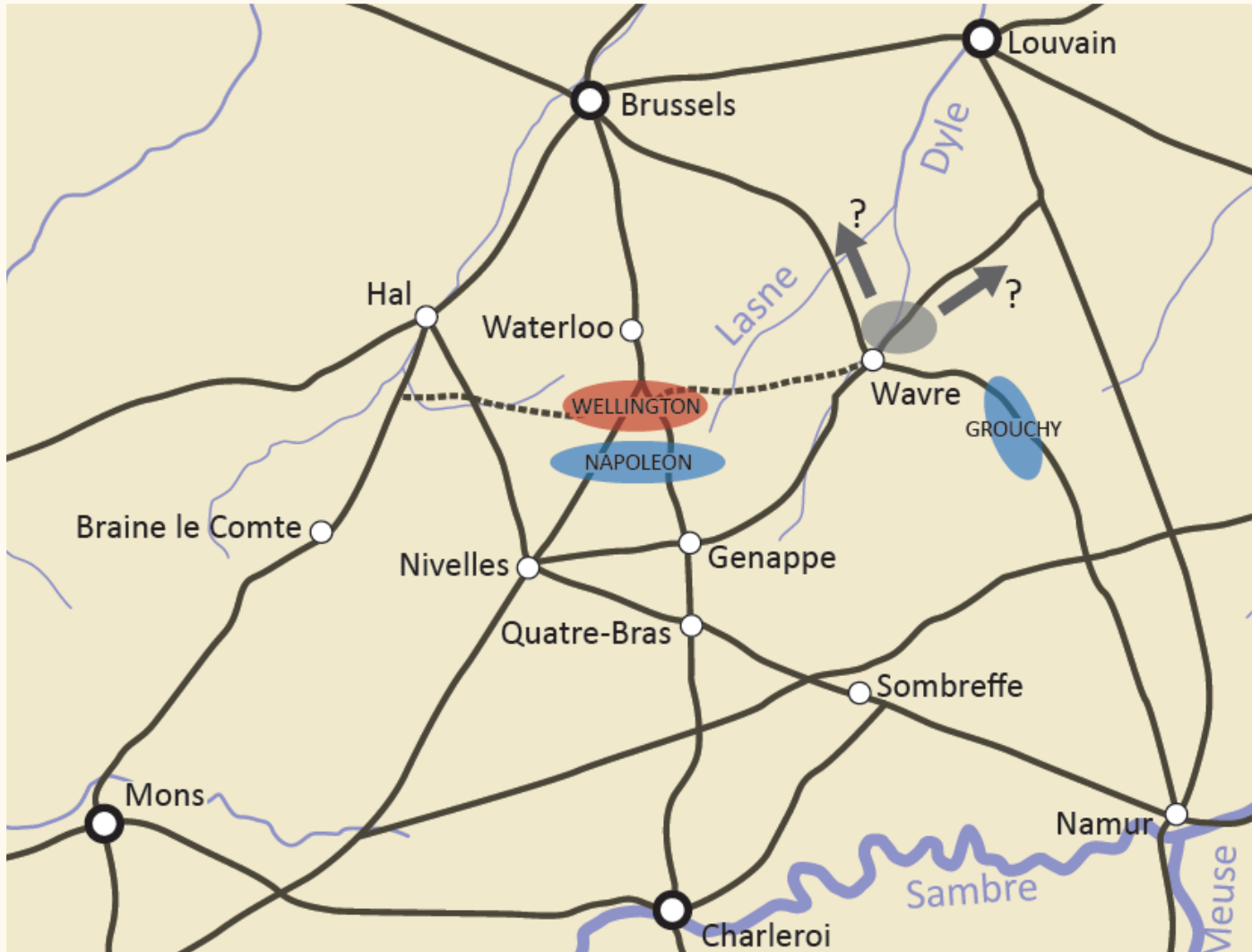
Actual positions at 1000h, 18th June



Wellington's view at 1000h, 18th June



Napoleon's view at 1000, 18th June



Napoleon's options for the fourth day, 18th June

- He knew that most of the Prussians were near Wavre, but did not know what they intended to do. He could choose to -
 - 1) admit the failure of the campaign and retreat,
 - 2) outflank Wellington's army to east or west,
 - 3) frontal attack soon after dawn, or
 - 4) frontal attack in early afternoon.
- For all three offensive options, he should have sent cavalry (and engineers) to delay any potential Prussian advance from Wavre towards Waterloo.



Events of the 18th June

- **Bulow's corps chosen to lead advance from Wavre.**
- **Over-zealous French attack on Hougomont.**
- **A quarter of the French army redeployed to oppose the Prussians.**
- **Attack by D'Erlon's French corps defeated by British infantry and cavalry.**
- **French cavalry squandered against allied squares.**
- **French captured La Haye Sainte and (temporarily) got a foothold on the ridge.**
- **Attack by 5 battalions (of 23) of Imperial Guard.**
- **Smaller battle at Wavre on 18th + 19th; French victory**



Lessons of Waterloo 1

- **In land warfare of this period a general should –**
 - Concentrate all available troops for a decisive battle,
 - Provide visible and active leadership, and
 - Exploit the defensive potential of terrain and buildings.
- **In managing an organization a leader should –**
 - Make a judicious selection of subordinates,
 - Identify and focus on the primary objective,
 - Insist on unremitting energy to achieve it,
 - Establish a clear command structure,
 - Provide unambiguous and sufficiently-detailed orders, and
 - Constrain selfish interests.



Lessons of Waterloo 2 – dealing with uncertainty – A commander should -

- **Resist overconfidence in own judgment.**
- **Manage all significant uncertainties, with appropriate precautions to reduce impact, e.g.**
 - Relocate Wellington's HQ forward.
 - Arrange for Blucher to sign order to Bulow.
 - Scout and block roads from Wavre.
 - Anticipate delays in Prussian march to Waterloo.
- **Use a structured approach to decision making.**
 - Identifies alternative scenarios and options.
 - Illuminates potential gains and losses.

